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Report on the STANLEY AREA

Cariboo Mining Division

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THE STANLEY AREA.

CHAPTER I.—INTRODUCTION.

Near Stanley, two major creeks and their numerous tributaries have yielded placer gold estimated to have a value of $10,000,000 or more. The extraordinary richness of parts of the placer creeks, together with the known distribution of the placer deposits, initially suggested that there might be some demonstrable relationship, such as has been found in the Barkerville Gold Belt to the north-east, between the placer-gold deposits, the known vein occurrences, the bedrock geology and the bedrock structure. Field-work was undertaken in the Stanley area in the hope that future prospecting and exploration might be benefited by the development of this idea.

SUMMARY.

1. The Stanley area is near Wells, lies on the eastern side of the Cariboo mountains, and is drained by Lightning and Slough Creeks and their tributaries.

2. Initial important placer-gold discoveries were made in 1861 and the original lode discoveries were made in the 1870's.

3. The area is underlain by schistose rocks, dominantly quartzitic, belonging to the Richfield formation of the Precambrian Cariboo series. The rocks cannot be correlated with members of the Barkerville Gold Belt. Few intrusive rocks are present.

4. Gentle open folds superimposed on closed overturned folds have been developed in the rocks during two periods of deformation. A major anticlinal axis, trending north-westward, lies more or less along the course of upper Lightning Creek.

5. Three major faults, striking slightly east of north, extend across the area from Slough Creek to Lightning Creek.

6. The rocks are cut by a regional system of joint fractures striking north-north-easterly and dipping steeply westward.

7. Formational quartz veins are fairly common, but none containing gold values is known.

8. The commonest "B" type quartz veins occupy north-north-easterly striking and westward dipping fractures of the regional joint system. Some of these veins are gold-bearing, others are not.

9. Pyrite is the common sulphide in the quartz veins; galena and sphalerite may be present in subordinate amounts.

10. In auriferous veins the gold is associated with pyrite, but not all pyrite is gold-bearing.

11. The fineness of gold from the Perkins veins on Burns Mountain ranges from 700 ± 25 to 916 parts gold per thousand.

12. Auriferous veins are not restricted to any zone nor to any one specific type of rock. Most occupy fractures belonging to the regional north-north-easterly trending system.

13. The gold-bearing veins may be Jurassic in age rather than pre-Mississippian as previously considered.

14. Placer gold has been mined from both shallow and deeply buried bedrock gravels on Lightning and Slough Creeks and many of their tributaries.

15. The total placer-gold production of the Stanley area is not definitely known. In the Lightning Creek section the value of the officially recorded gold production since 1874 is $1,992,845. The total production since 1861 is conservatively estimated to be between $5,000,000 and $6,000,000 and may have been as much as about $12,000,000.

In the Slough Creek section the value of the officially recorded gold production since 1874 is $1,282,176. The total production since 1861 may have been as much as $3,000,000 or more.

16. The bulk of the placer gold produced from Lightning Creek was mined along an 8,000-foot stretch extending down-stream from the mouth of Van Winkle Creek almost to Stanley.

17. The bulk of the placer gold produced from the Slough Creek section was mined from Nelson and Burns Creeks and from benches on the south side of Slough Creek between those two creeks.

18. The true fineness of Lightning Creek placer gold is variable but appears to increase progressively down-stream from Houseman Creek. The fineness is 886 at Houseman Creek, 905 at Butcher Bench, and 915 at Donovan Creek.

19. The true fineness of placer gold from the Slough Creek section varies slightly but averages about 930 fine. It is higher than that of placer gold from the Lightning Creek section.

20. By far the largest amount of placer gold from the Stanley area was produced from those stretches of Lightning and Slough Creeks and from their tributaries lying within or very close to the area bounded on the west by the Last Chance-Nelson Creek fault and on the east by the Butcher Bench-Burns Creek fault.

21. The stretch of rich placer on Lightning Creek coincides with an area of intensely folded rocks along a major anticlinal axis which runs down the creek.

22. There is no areal correlation apparent between rich placer-gold occurrences and the outcrop of a particular formation. The general association appears to be with bedrock structures.

23. The known gold-bearing veins of the Stanley area are not considered to have been the sources of the richest placer-gold deposits.

24. It is considered that attractive possibilities exist for intensive prospecting for gold-bearing veins along and close to the Last Chance-Nelson Creek, Grub Gulch-Coulter Creek, and Butcher Bench-Burns Creek faults, and also along Lightning and Slough Creeks close to the stretches where the richest placers were mined.

25. The widespread, deep drift-cover will make future prospecting exceedingly difficult.

LOCATION.

The Stanley area is in the Cariboo Mining Division and lies to the south-west of the town of Wells. It is traversed by the Quesnel-Wells Road, by which the settlement of Stanley is about 9 miles from Wells and about 45 miles from Quesnel, the terminus of the Pacific Great Eastern Railway. The area is about 4½ miles wide by about 6½ miles long and lies in the south-west corner of Geological Survey, Canada, Map 336A, Willow River Sheet (East Half), just north of latitude 53 degrees north and just west of longitude 121 degrees 30 minutes west.

PREVIOUS WORK.

Previous geological work has been done largely by the Geological Survey of Canada. Brief mention of the early placer operations was made by Dawson in Annual Reports of the Geological Survey of Canada 1876–77, Vol. III, Pt. II, 1889, and Summary Report, 1894. The first work in any detail was done by Amos Bowman in 1885 and 1886. The results were published as a geological map of the Cariboo area on a scale of 2 miles to the inch, on which was shown his mapping of the distribution of the Cariboo schists. The map shows the axis of an anticlinorium that he was first to recognize as the major structural element of the region. In addition, a detailed map was published on a scale of 900 feet to the inch of the placer-workings and known quartz-vein occurrences on Lightning Creek (near Stanley) and its tributaries. An interesting feature of this map is the tracing of an anticlinal axis extending from the mouth of

Houseman (Eagle) Creek down-stream along Lightning Creek to the mouth of Anderson Creek. These maps were accompanied by a report of the bedrock geology of the Cariboo region and a description of all known quartz-vein occurrences.

In 1926 the Geological Survey published Memoir 149, by Johnston and Uglow, with its accompanying map of the Cariboo area. This geological map, on a scale of 1 mile to the inch, revised and refined the earlier mapping of Bowman. The Cariboo schists were described and subdivided into three formations and their areal extent more precisely mapped. The major anticlinorium of Bowman was retained, numerous northeasterly trending faults and others were recognized and mapped, the placer-occurrences along Lightning Creek were described, and much valuable information, obtained from "old-timers" living at that time, was published. Hanson's report on the Willow River map-area, published in Geological Survey, Canada, Summary Report 1933, Part A, covers Geological Survey Map Nos. 335A and 336A, Willow River Sheet (East Half and West Half), but the mapping in the Stanley area is identical with that of Uglow's earlier map.

The publication in 1935 of Memoir 181, Hanson's study of the Barkerville Gold Belt, made possible a clearer understanding of the structural and stratigraphic localization of the quartz veins in the Barkerville Belt. It has served as the basis for more detailed work in that area and for generalizations of wider application.

Much specific information having to do with various placer and lode operations is contained in the Annual Reports of the Minister of Mines from 1874 to the present.

PRESENT WORK.

The present report is based on two and one-half months' field-work in 1945 and three months' field-work in 1946. No maps on a suitable scale were available for plotting on the field scale of 400 feet to the inch. The base map was prepared from mineral-claim surveys and was plotted by co-ordinates. All surveyed claims are linked by Lands Branch surveys so that the accuracy of all corner posts is assured. All lines and posts can be found on the ground, and their positions on the final map are shown, even though the individual lot surveys may have been cancelled or not recorded. Lots whose surveys have been cancelled are shown on the map with a "C" after the former lot number; e.g., L. 10443C.

Map details, including geological observations, creeks, roads and trails, mine-workings, etc., were located by tape and compass traverses tied in wherever possible to lot corners close to the lines of traverse. Additional geological information was plotted from tape traverses run along cut and blazed claim-lines, and from plane-table surveys around the mine-workings on Burns Mountain and Oregon Gulch.

Tape and compass traverses were plotted on the base map on a scale of 400 feet to the inch. The resulting plans in turn were compiled on a scale of 1,000 feet to the inch, preparatory to publication.

It was not found practicable to do sufficient surveying to prepare an accurate and detailed topographic map. As an alternative, Geological Survey of Canada Map No. 336A was enlarged, and from it the topographic detail was taken to prepare Fig. 1. The magnetic declination throughout was taken to be 26 degrees 20 minutes east.

ACKNOWLEDGMENTS.

The writer would like to acknowledge the co-operation of the property-owners and residents in making information available and for releasing for publication valuable statistical information supplied to the Bureau of Economics and Statistics.

GENERAL CHARACTER OF THE AREA.

The area lies within the Cariboo Mountains, somewhat west of the central axis of the group. To the west of the area, summit levels are progressively lower until by

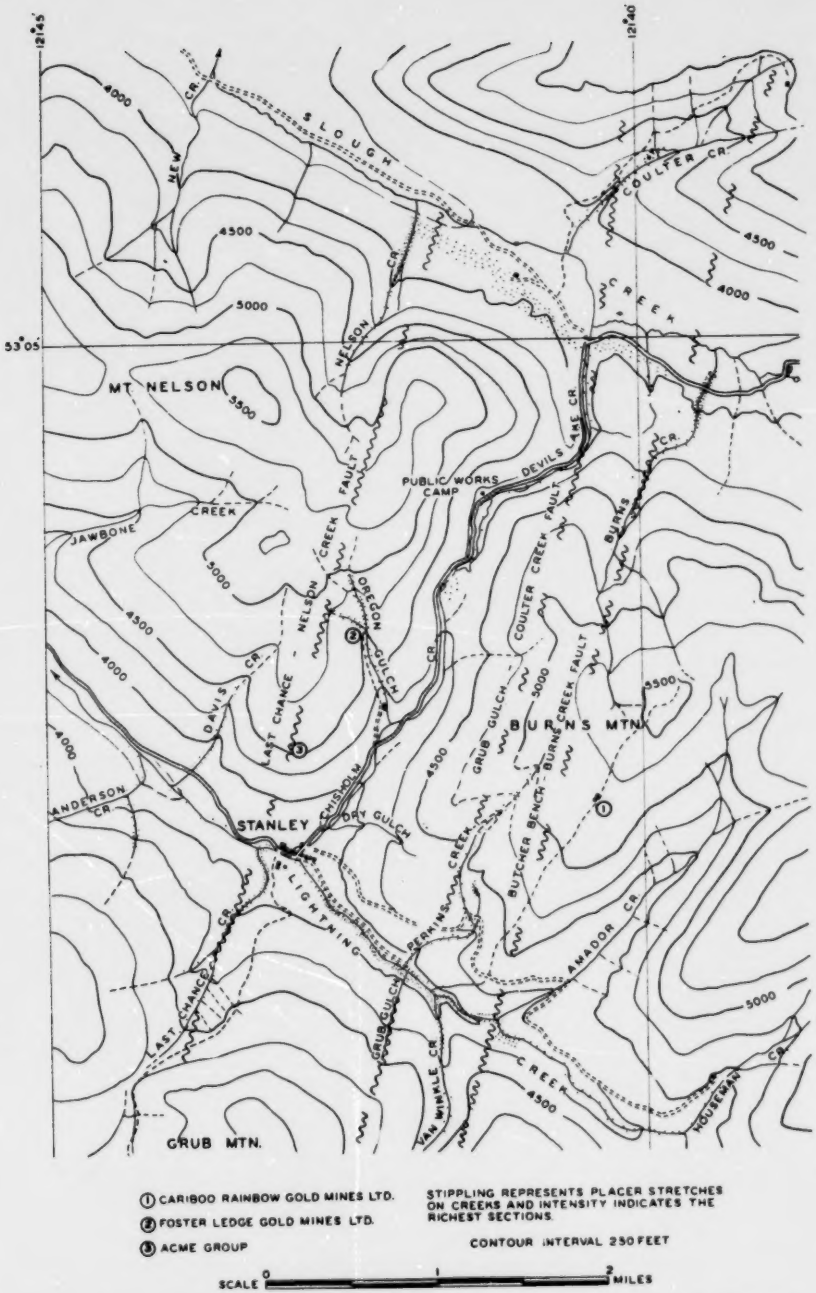

Fig. 1. Topographic map of the Stanley area, showing major faults, locations of main auriferous quartz veins, and distribution of placer gold.

transition the country merges into the Interior Plateau, while to the east summit levels rise to greater altitudes in the heart of the Cariboo Mountains near Bowron Lake.

The maximum relief in the Stanley area is about 1,800 feet. The ground rises from Lightning and Slough Creeks, both lying at about 3,800 feet elevation, to the summits of Mount Nelson, Burns and Grub Mountains, which lie at about 5,500 feet. The divide between Chisholm Creek, flowing into Lightning Creek, and Devils Lake Creek, flowing into Slough Creek, is at about 4,250 feet elevation. The main road from Quesnel follows along these creeks and through the low, steep-sided, narrow, rocky pass which connects them.

The area is drained by Lightning and Slough Creeks, both of which flow north-westerly on gentle gradients and are roughly parallel. Their tributaries are short and fairly steep, and flow north-easterly and south-westerly into them. In plan, the drainage lines form a noticeably rectangular pattern.

For about 1½ miles down-stream from the mouth of Houseman (Eagle) Creek, Lightning Creek flows through a series of steep-sided rock-canyons with remnants of bedrock benches and high gravel terraces flanking the creek on either side. From the foot of Spruce Canyon, just up-stream from the mouth of Van Winkle Creek, the valley-bottom widens progressively from about 100 feet to 800 feet or more near the mouth of Anderson Creek. In this section the creek is flowing on from 50 to 150 feet of fill, of which the top 5 feet or more is hydraulic tailings from the operations at the mouth of Amador Creek. Very few remnants of low bedrock benches and higher gravel terraces appear along the valley-sides, the most obvious being Nason Point, the Point, and the benches on both sides of the creek at and below Stanley.

A notable feature of the valley between the cemetery below Stanley and Davis Creek is the pitted, kettle-hole topography of the glacial fill along the north side of Lightning Creek. The undrained depressions extending southward from the canyon on Lightning Creek just below the mouth of Houseman Creek mark another stretch where the valley was blocked by glacial material. A few isolated kettle-holes are to be seen east of the mouth of Perkins Creek and to the east of Stanley.

Slough Creek valley is wide, the valley flat being about 2,000 feet across, and at some earlier time both Williams and Jack of Clubs Creeks may have drained through it. It is flanked on the south side, between the mouths of Burns and Nelson Creeks, by a prominent bedrock bench. The creek flows north-westward on a low gradient over as much as a 290-foot depth of unconsolidated valley fill. The surface of the gravel benches east of Devils Lake Creek display a variety of irregular glacial kettle topography.

The valleys of Chisholm and Devils Lake Creeks head at a divide having an elevation of about 4,250 feet. In Chisholm Creek valley, near the junction of Oregon Gulch, the surface of the glacial fill, which has a depth at the Snowden shaft of 203 feet, displays irregular kettle topography. This valley is open and straight and stands out in sharp contrast to the narrow, sinuous, steep-sided rock-walled valley of Devils Lake Creek to the north.

For the most part the tributaries of Lightning and Slough Creeks are fairly short and have steep gradients. In their lower stretches they may flow through a short canyon before joining the parent stream.

In the two major valleys the sides rise fairly steeply, in some places by a series of steps, to the highest terrace level, which may be as much as 300 feet above the valley-bottom. From there the slope lessens somewhat and the valley-walls rise more or less uniformly to the three high summits.

On a small scale, particularly on some of the eastern slopes of Mount Nelson and near the summit of Burns Mountain, there are alterations of short, steep, and gentle slopes that may be the result of differential weathering of gently dipping, alternating layers of hard and soft rock.

Other noticeable topographic features, whose interpretation may be of some practical use, are numerous northerly-trending straight steep-sided depressions or gullies.

These gullies, from a hundred feet to as much as a thousand feet long and from 10 to 40 feet deep, range in direction from north to about north 30 degrees east. They may cross the tops of ridges or may run at any angle to the slope of a hillside. It was possible to demonstrate that several gullies mark the courses of faults. Consequently, in many instances it is probable that these straight, north-trending depressions are the result of erosion along either a fault or a zone of closely spaced fractures. Long, particularly noticeable gullies lie at the divide between Oregon Gulch and Nelson Creek on Lot 10431, along the hillside on Lots 11354 and 10443c south of the right-angle bend in Devils Lake Creek east of the Public Works camp, by the Foster Ledge adit on Lot 8897, and on the divide between Olally Creek and Amador Creek.

The area for the most part is covered by a mantle of glacial drift which, in the valley-bottom and on lower hill-slopes, is very thick, but which thins to a few feet or less at about 5,000 feet elevation. As a consequence, natural bedrock-outcrops, except in certain places, are scarce.

Good natural bedrock-exposures may be seen along Devils Lake Creek and the lower rocky slopes flanking it, on the ridge to the west of the Public Works camp, on the upper few hundred feet on Burns Mountain, along the canyon section of Lightning Creek, and in the canyon sections in the lower stretches of tributary creeks. Excellent exposures of bedrock are laid bare by hydraulic operations on the Slough Creek benches, in the Ketch pit, Butcher Bench and Amador pits, and along Houseman, Perkins, Last Chance Creeks, and a few others.

In contrast, few, if any, outcrops are to be seen along the upper stretches of Nelson, Coulter, Burns, Davis, Last Chance, Van Winkle, and Amador Creeks. The chances of seeing more than a few outcrops on the slopes of Grub Mountain and Mount Nelson appear very remote. It was observed that even on hillsides having a slope of 20 to 25 degrees the drift-cover is sufficiently thick to obscure bedrock over large areas. In numerous instances full-sized mineral claims are known to have no bedrock exposures at all. This lack of outcrop makes geological mapping difficult. It has deterred prospecting in the past and will hamper any future exploration.

The drift-cover above 5,000 feet elevation on the top of the ridge leading to Burns Mountain, and in certain places along the ridge-top west of Chisholm and Devils Lake Creeks, is shallow enough to allow extensive economical bulldozer stripping, but few other places were seen where bulldozer stripping would be economical.

BRIEF HISTORY OF MINING.

Interest in the Stanley area since the discovery of placer gold on Lightning Creek in 1861 has been largely centred on placer-mining. Lode discoveries were made in the 1870's, and although a small amount of gold has been recovered from the Perkins vein on Burns Mountain, there has been little lode-mining of consequence.

Placer gold was first discovered on Lightning Creek in 1861. For several years thereafter there was a large production of gold from shallow, easily worked gravel on Last Chance and Van Winkle Creeks and from bench gravel on Nason Point, Butcher Bench, and Spruce Canyon. The claims were then largely abandoned, and it was not until ten years later that the richest ground on the creek was found and worked when the Victoria, Vancouver, Van Winkle, and other companies sank shafts to work the extremely rich bedrock gravels at depths of 60 to 90 feet below creek-level. By 1879 the deep ground had been largely worked out. Later, attempts to work ground left by earlier companies were made by deep drifting from La Fontaine shaft near the mouth of Anderson Creek and by using hydraulic elevators at the mouth of Amador Creek. Other remnants left unworked in the 1870's were salvaged near the Point early in 1900, and by Stanley Mines, Limited, as recently as 1941 and 1942.

After the period of deep drift-mining, hydraulic operations were begun on Last Chance, Perkins, and Davis Creeks, and at the mouth of Amador Creek, and drifting in shallow ground largely by individuals was continued in a number of other places.

Currently there are small hydraulic operations on Houseman Creek and Grub Gulch, a large hydraulic on the bench east of the mouth of Amador Creek, a shaft being sunk on a bench east of the Last Chance hydraulic pit, from which a remnant of the channel of lower Last Chance Creek will be mined, and a ground sluice-pit at Dry Gulch east of Stanley.

Nelson and Burns Creeks on Slough Creek drainage were probably the first creeks discovered and worked in that section. It is said that Nelson Creek was extremely rich and fairly shallow. Gravel on Burns, Devils Lake, Nelson, and Coulter Creeks was drifted in the very earliest days, and subsequently hydraulic plants were put in on Burns Creek and upper Coulter Creek.

The discovery of placer gold on the benches on the south side of Slough Creek between Devils Lake Creek and Nelson Creek was made by Chinese miners in 1881. The entire stretch now has been hydraulicked and, since the discovery, has been worked entirely by Chinese companies. The Ketch hydraulic mine, east of Devils Lake Creek, is on a continuation of these benches.

Currently, hydraulicking continues at the Ketch and on the Slough Creek benches largely as scavenging operations, while one small hydraulic on Coulter Creek and two on Devils Lake Creek are still operated.

In the past, lode-mining interest has centred principally on the Burns Mountain quartz veins and the Foster Ledges on Oregon Gulch. The veins evidently were found early in the 1870's, for by 1878 J. C. Beedy had done some work on the Burns Mountain veins and in that year at Van Winkle built a quartz mill said to be the equivalent of a five-stamp mill. This mill was operated during 1879 and until Beedy's death in January, 1880, treating quartz ore hauled from the Beedy, later called Perkins, veins near the top of Burns Mountain. The claims were then bought by James Reid, who drove a crosscut adit in from the west side to intersect the veins at a depth of about 75 feet. In the early 1880's the ground was acquired by Edwin Perkins, who mined the veins to a depth of about 50 feet and crushed the ore in a man-power arrastre, the remains of which may still be seen near his cabin. After his death in 1919 the ground was acquired by C. Fuller and D. Hawes, who in turn sold it to the Burns Mountain Gold Quartz Mining Company, Limited, in 1932. This company drove a long crosscut adit to intersect the Perkins veins at a depth of about 180 feet below the Reid adit. The claims subsequently were relocated and acquired by Cariboo Rainbow Gold Mines, Limited.

Other veins at the summit of Burns Mountain, about 4,000 feet north-east of the Perkins veins, were explored between 1881 and 1886 by a shaft and by a long crosscut driven by the Burns Mountain Quartz Mining Company.

The Foster Ledges, near the west branch of Oregon Gulch, were found about the same time as the veins on Burns Mountain. They are narrow veins, from which extremely high gold assays prompted a small amount of surface work and the sinking of a shallow shaft in 1877. Subsequently, the shaft was deepened to a depth of about 56 feet and an adit was driven about 230 feet to intersect the several closely spaced veins at shallow depth. Later, about 1920, the claims were acquired by C. Fuller and D. Hawes, who in turn sold them in 1933 to Foster Ledge Gold Mines, Limited. Two short adits have been driven on veins farther down Oregon Gulch.

In 1933 and the subsequent few years, exploratory work was done by Cariboo Amalgamated Gold Mines, Limited, mainly on the Eldorado claim (Lot 11350) north of the Public Works camp on Devils Lake Creek; by B.C. Cariboo Gold Fields, Limited, on veins on upper Burns Creek and between Burns and Devils Lake Creek; by Cariboo Ledge Mines Company, Limited, on the Dominion claims east of the mouth of Anderson Creek; and by Bridge Island Gold, Limited, on a large vein near the head of Coulter Creek.

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CHAPTER II.—BEDROCK GEOLOGY.

REGIONAL.

The central part of the Cariboo region, a belt 15 to 20 miles wide and about 50 miles long, is underlain by a thick series of non-fossiliferous, metamorphosed sedimentary rocks of Precambrian age. These rocks, known as the Cariboo series, are subdivided on the basis of lithology into three formations. The Richfield formation, which is dominantly quartzitic, is overlain by the Barkerville formation, chiefly limestone and calcareous sediments, which in turn is overlain by the Pleasant Valley formation, chiefly argillaceous sediments. In the Little River area, south-east of Cariboo (Swamp) River, the Cariboo series is overlain by fossiliferous Lower Cambrian rocks.

In the Barkerville Gold Belt the upper part of the Richfield formation has been subdivided (Hanson, 1935, p. 4), from the base of the Barkerville formation downward, into the Baker, Rainbow, B.C., Lowhee, and Basal members. Later, detailed work in Island Mountain mine (Benedict, 1945, p. 761) and at Cariboo Gold Quartz mine (Skerl, 1948*a*, p. 574) suggests that not only may this upper part of the succession be overturned and the Rainbow be younger than the Baker, but that the Rainbow and Lowhee members, and the B.C. and Basal members, though originally mapped separately, may be the same members on opposite limbs of a very close overturned fold.

The major structural element of the Cariboo series is a broad anticlinorium whose axis trends north-westward. As a consequence, the central belt of Cariboo schists is flanked on the north-east between Summit and Kimball Creeks by north-easterly dipping Mississippian sediments and volcanics of the Slide Mountain series, and on the south-west, between Wingdam and Likely, by south-westerly dipping Jurassic volcanics and sediments of the Quesnel River group.

Igneous rocks are infrequent. They comprise sills and dykes of altered, difficultly-identifiable, quartz and feldspar porphyry of the pre-Mississippian Proserpine intrusives; sills and dykes of diorite and diabase of the Jurassic (?) Mount Murray intrusives; stocks of Mesozoic quartz monzonite and diorite in the Little River area; and stocks of post-Jurassic granite, diorite, and other types in the Quesnel Forks area.

DETAILED.

The Stanley area is underlain by a succession of metamorphosed sedimentary rocks belonging to the Precambrian Richfield formation. The rocks cannot be correlated with members of the Barkerville Gold Belt. The area straddles the regional anticlinal axis which has been mapped previously (Johnston and Uglow, 1926, p. 31) as running between Mount Amador and Mount Nelson.

Quartzite in almost bewildering variety is the predominating rock in the area. It displays variations in colour from white and light grey, through medium grey, brown, to black; in granularity from fine quartzite to coarse grits with interbeds of metamorphosed pebble conglomerate; in composition through admixture with varying amounts of dark argillaceous material; and in fissility either through variations in amount of mica developed in the rock or through the rocks' relation to the axial planes of minor folds. Individual beds, ranging from a fraction of an inch to several tens of feet in thickness, are interbedded with others which may vary in colour, granularity, and general composition.

Dominantly argillaceous rocks are considerably less common than quartzites. They are present as black slate and dark schistose quartzitic argillite, grey argillaceous schists, and as thin partings and interbeds of dark argillaceous material in a dominantly quartzitic succession. The grey colours of most quartzites are due to the variable content of dark argillaceous and, in some instances, graphitic material.

For the most part the rocks are not calcareous. The few thin limestone beds could not be traced for any great distance and their correlation was not possible. Many of the rocks have a low to moderate amount of carbonate mineral which, when determined, was found to be ankerite.

Green chloritic schists, some weathering brown and some exceedingly brightly coloured, are also present. Some chlorite schist contains thin layers and lenses of grey or white limestone. In several places pale, greenish-grey quartzite schists are exposed; their green caste evidently is the result of the development of small amounts of chlorite.

The rocks represent a sedimentary succession that has been subjected to regional metamorphism. Cleavage, in varying degrees of perfection, is developed in all rocks and is the result of the oriented development mainly of sericite and less commonly of chlorite. The perfection of the cleavage depends primarily on the initial composition of the rock and the amount of argillaceous material that was available to form mica. To a lesser extent the position of the rock in relation to the axial plane of a fold contributes to the degree to which the cleaner, more massive quartzites are cleaved.

Microscopic examination of coarse, massive, or flaggy quartzites reveals the presence of small amounts of oriented mica flakes. For the most part the cleavage appears to be closely parallel to the bedding, though in many instances, particularly close to the axes of drag-folds, it is seen cutting across the bedding at varying angles.

During the course of mapping it was never possible to trace any particular bed more than a short distance either because of lack of outcrops or of lithologic changes along strike. In some instances highly schistose beds disappear by being thinned and drawn out or sliced off along the limbs of closely compressed drag-folds (*see* Plate II B).

Microscopic examination of a number of thin sections of various rock-types reveals that the commonest constituent minerals are quartz, sericite, chlorite, and ankerite. It was observed that some of the coarser quartzites contain small amounts of feldspar, both orthoclase and oligoclase, as fragmental grains and interstitial material. The presence of feldspar fragments raises a problem as to the source of the material, for the Proserpine intrusives are younger and no older feldspathic rocks are known.

Ankerite is a common mineral of the rocks in amounts up to as much as 50 per cent. Dark-grey, reddish-brown weathering ankeritic quartzites from Last Chance hydraulic pit and the west branch of Oregon Gulch contain 30 to 50 per cent. ankerite. The ankerite varies in composition from place to place and may contain a small amount of manganese. It appears in some quartzites surrounding and partly or wholly replacing the quartz grains, and replaces both phenocrysts and ground-mass minerals of the Proserpine intrusives. In certain quartz-sericite schists, ankerite occurs as euhedral crystals, which give a porphyritic texture to the rock and which cut across foliation planes. The ankerite does not appear to be a primary rock constituent. It is believed to have been introduced during a period of widespread ankeritization, during which time not only the Cariboo schists but also the Proserpine intrusives were affected.

It was not found possible, because of the combination of scarcity of outcrops and the lack of distinctive marker beds, to represent recognizable formational units on the final map. However, in the succession there are some distinctive rocks of varying areal extent that, with more detailed work and with more exposures, either natural or artificial, could be delimited in some detail.

Black argillaceous and graphitic quartzites and black slate are particularly noticeable on both sides of the canyon on Devils Lake Creek north of the Public Works camp. These rocks appear on the west side of the road in two main belts, one of which runs north-westerly uphill through Lot 11350, away from the road; the second is obscured by overburden. On the south and east side of the road they appear in two areas, one in the southern half of Lot 11354, and the other between Hong's siphon and the Ketch pit in a belt about 1,500 feet wide which extends eastward towards Burns Creek, where it is presumably displaced southward along a fault. East of the Burns Creek fault, argillaceous rocks outcrop on Burns Creek near the crossing of Hong's ditch. Another

narrow belt of black argillaceous quartzite crosses Lot 1685c, at the head of Olally Creek, in a north-westerly direction, but could not be traced farther towards Burns Creek. Elsewhere in the area black quartzite and argillite is not common. It is to be seen in a band a few tens of feet wide on the west branch of Oregon Gulch where it is presumably cut off by a fault, in the south-west corner of Lot 1670 on Davis Creek, and along the east side of Last Chance Creek south of the head of the hydraulic pit where its westward extension is cut off by a fault.

Hard, massive, and partly silicified medium to light grey quartzite outcrops in a band about 600 feet wide along the trestle on the east side of Devils Lake Creek south of Hong's siphon. It is thought to extend eastward to terminate against a fault at Burns Creek. Light-grey quartzite outcrops on the bluffs and upward to the top of the ridge between the Public Works camp and the head of Oregon Gulch, on the nose of the ridge between Oregon Gulch and Davis Creek, and near the summit of Burns Mountain.

The rocks along Oregon Gulch and exposed in the Foster Ledge workings are grey and brown, generally brown weathering, thinly interbedded quartzite and schist layers. They have a general resemblance to thinly bedded quartzite and schist in and around the workings on Burns Mountain and along Lightning Creek down-stream from Houseman Creek.

Massive, coarse, dark-grey quartzites containing smoky or opalescent quartz fragments to the size of small rice grains and in beds a few feet to a few tens of feet thick were observed in many places. Such quartzite outcrops along Lightning Creek between the old Victoria shaft and Spruce Canyon, along Dry Gulch, at various places along Chisholm Creek, on the Slough Creek benches, in the divide east of Burns Mountain, and elsewhere. These beds are interbedded with varying amounts of more schistose rocks, such as quartz-sericite schist and grey mica schist. Although the quartzite in itself is distinctive, no correlation between beds or a succession of beds was possible.

Coarse grits in places contain beds of quartz pebble conglomerate in which pea- and grape-sized pebbles are squeezed and drawn out to a length of as much as 2 inches. Conglomerate is exposed in beds a few tens of feet thick about 200 feet south of Eric Rask's hydraulic pit, in Last Chance hydraulic pit, at the north-east corner of Lot 11404 around the Cariboo Ledge workings, near the Cohen Incline, near the south-east corner of Lot 1666, and near the north-east corner of Lot 10443c. The conglomerate beds are lenticular and do not persist along strike. No correlation of these coarser beds was possible.

Chlorite schists, though distinct in colour, are commonly so soft as to form few outcrops. Bright-green chlorite schist was observed in a small patch of bedrock uncovered at the head of the sluice-flume in Dry Gulch ground-sluice pit, and also on the south side of Lightning Creek in Spruce Canyon immediately below Butcher Bench. On Anderson Creek brightly coloured chlorite schist immediately overlies limestone in the old Trelease placer-workings and outcrops across a width of possibly 2,000 feet. Near its base the chlorite schist is bright green and is interbedded with thin layers and streaks of grey limestone, but above, the schist becomes darker, weathers to a greenish-brown, and contains no limestone. Along its projection to the south-east, the band should cross the upper part of Last Chance and Van Winkle Creeks. No chlorite schist was observed there, but a number of boulders of similar rock found above the intake of the lower Grub Gulch ditch indicates that the belt may cross at some point farther up-stream. Some quartzites in the canyon of Lightning Creek below the mouth of Houseman Creek, on the west side of Devils Lake Creek north of Leo Bedford's hydraulic pit, and in the canyon of Coulter Creek, have a greenish-grey hue resulting from the development of a small amount of chlorite in the rock. Chloritic schist and chloritic quartzite near the limestone at the west end of the Ketch pit suggest a

similarity with the schist and limestone association on Anderson Creek, but the two could not be correlated.

Limestone-beds are few in number, and the other rocks are for the most part non-calcareous. The largest limestone-bed, about 100 feet in thickness, is exposed in the canyon on lower Anderson Creek in the north-west corner of Lot 11404. The limestone is light grey, thinly bedded, and dips south-westward beneath bright-green chlorite schist. A limestone-bed about 25 feet thick is exposed on both sides of Last Chance Creek at and south of the west fork, where it is displaced by a fault that runs along the creek.

One might expect, because of their strike, that the limestone on Anderson Creek and that on Last Chance Creek would be the same. Any correlation between the two is uncertain because of the lack of intervening outcrops and of the differences in succession of beds at the two places. Should the two correlate, it would mean that there has been a considerable thinning of the limestone between Anderson and Last Chance Creeks, and also a change in the overlying rocks from chlorite schists to more quartzitic rock on Last Chance Creek.

A few boulders of grey limestone seen along Van Winkle Creek up-stream from the intake of the lower Grub Gulch ditch suggest that a bed of limestone crosses the creek at some unobserved point higher up-stream.

Several thin limestone-beds are exposed in the west end of the Ketch hydraulic pit and in a bluff 300 feet to the south. The limestone is interbedded with pale greenish-grey chloritic schists and quartzites. These limestone-beds were not traced to the east and could not be found on the west side of the fault that runs along Devils Lake Creek. Despite the general association of limestone and chloritic beds at the two places, there appears to be no correlation of the limestone at the Ketch with that on Anderson or Last Chance Creeks.

Another limestone-bed, about 75 feet thick with thin interbeds of grey schist, outcrops on the north side of and near the mouth of Coulter Creek. Its eastward projection is presumably faulted to the position occupied by similar limestone on the south side of Coulter Creek near the foot of the canyon. This limestone dips northward and is overlain by largely medium- to dark-grey quartzite.

A few thin limestone-beds are interbedded with argillaceous rocks at the east end of the trestle crossing Burns Creek.

The presence of one or more limestone-beds on Burns Mountain is suggested by finding a succession of limestone boulders on Perkins Creek extending from the mouth to the top end of the placer-workings, and by a few limestone boulders in the placer-workings on Burns Creek. A few thin limestone fragments were seen in rock from the dump from the long crosscut adit on the south-east side of Burns Mountain. No limestone-outcrops were seen on the mountain.

There are few known intrusive rocks in the area. Those present are correlated with either the pre-Mississippian Prosperine intrusives or the more basic, Jurassic, Mount Murray intrusives.

The only recognized Prosperine-type intrusive is exposed in several places in the canyon of Lightning Creek, about 600 feet down-stream from the junction of Houseman Creek. The rock is hard, medium grey, slightly schistose, and spotted with small grains of red-brown weathering ankerite. For the most part the rock appears to be conformable with the adjacent quartzite, but one outcrop suggests minor transgressing of the beds. Examination of a thin section of the rock reveals both quartz and feldspar phenocrysts lying in a fine-grained ground-mass of the same minerals. The rock is a slightly schistose fine-grained quartz feldspar porphyry or rhyolite porphyry. Ankerite in small grains and irregular patches replaces the phenocrysts and ground-mass. The ankeritization evidently is the same that has affected various members of the Cariboo schists.

In hand specimen the rock appears similar to quartzite beds in the schist succession, and because of this similarity it is possible that other dyke-occurrences may have been overlooked.

A 50-foot brown-weathering diabase dyke is exposed for a length of about 500 feet in hydraulic workings on the Slough Creek bench in the south-east corner of Lot 10544c. It is composed of hornblende and andesine laths and a small amount of interstitial quartz. The dyke strikes slightly east of north and cuts across the adjoining quartzites.

A 5-foot augite basalt dyke is exposed in the bed of Nelson Creek about 600 feet north of the crossing of the New Creek ditch. Both these dykes are massive and are presumably related to the Jurassic, Mount Murray intrusives.

CHAPTER III.—STRUCTURAL GEOLOGY.

REGIONAL.

The major structural element of the Cariboo series in the Barkerville region is a broad, open anticlinorium whose axis trends about north 55 degrees west from Mounts Pinkerton and Amador to Mount Nelson. On the north-eastern side of the axis the beds dip generally north-easterly and on the south-western side generally south-westerly. Farther to the east and to the west the Slide Mountain series and the Quesnel River group are involved in this regional anticlinal structure. The Cariboo schists are not only complexly folded and drag-folded but, in addition, are cut by large northerly and north-easterly trending normal faults, some strike-faults, and are traversed by regionally developed north-north-easterly striking fractures or joints.

The Stanley area lies across the axis of the regional anticlinorium.

DETAILED.

The accompanying geological map does not show the distribution of any rock members, and for that reason the representation of folding cannot be complete. To substitute for this deficiency, structural lines have been drawn which are an interpretation, incomplete and possibly imperfect, of the available information. They are lines, based on numerous strike and dip observations, which are generalizations and which are intended to illustrate the attitude of the bedrock formations. They should not be interpreted as indicating the outcrop pattern of a particular bed, for they are drawn without regard to topography. Minor drag-folding, either observed as such or interpreted from strike and dip observations, is represented by S- and Z-shaped structural lines.

Knowledge of the fold structures is incomplete because of the complete absence of determinations of the tops or bottoms of beds. No observations of cross-bedding or grain-size variations were possible, and attitude determinations based solely on flow cleavage-bedding relationships, unless supported by other evidence, may not be completely reliable in an area where there may be unsymmetrical folding and where there is more than one period of deformation.

The observations on which the structural lines are based are measurements of strike and dip of the bedding of the bedrock formations. For the most part, cleavage is parallel to the bedding or is only a few degrees divergent from it. The exceptions are at places near the axes of drag-folds, where the cleavage is parallel to the axial plane of the fold and cuts across the bedding (*see* Plate III A). On the limbs of such folds, cleavage and bedding are closely parallel. In some outcrops where cleavage is observed and bedding is indistinct or indeterminate, the attitude recorded is that of the cleavage. Its use is based on the assumption that the bedding is essentially parallel to it.

The folds indicated by the structural trend lines are folds largely representing a second period of deformation. The primary flow cleavage has been folded, and the inter-layer movement accompanying the bending has taken place along cleavage planes which may be developed as prominently as, or more prominently than, bedding. Besides the actually observed large-scale folding of primary cleavage, the second deformation has produced in some places flow cleavage which is parallel to the axial planes of the younger folds and which cuts across the earlier better-developed cleavage.

The second deformation folds are gentle open structures, and their representation by structural lines on the map masks the older structures. These older structures, which were accompanied by the regional development of cleavage, are rarely seen. They are thought to be tight, overturned, and to have been accompanied by the formation of tight small drag-folds, such as may be seen in the hydraulic pits on the Slough Creek benches and near the summit of Burns Mountain.

Folds.

In the area the rocks, though considerably folded, generally have a westerly to north-westerly strike with low to moderate north-easterly or south-westerly dips. North, north-easterly, and easterly dips in the area lying north-east of Lightning Creek, changing to south-westerly and southerly dips in the area lying south-west of Lightning Creek, indicate that the axis of the regional anticline trends about north 50 degrees west and more or less coincides with the course of Lightning Creek between the junction of Houseman Creek and the mouth of Anderson Creek. This is about 2 miles south-west of its previously mapped position between Mounts Amador and Nelson. Bowman, on his detailed map of Lightning Creek,* indicated a minor anticlinal axis in a similar position, but mapped the major axis as lying to the north-east. There is no evidence in the Stanley area of the position of the major axis as formerly mapped.

In detail, the position of the axis is indicated as lying between the south-westerly dipping beds on Anderson Creek and the north-easterly dipping beds on Davis Creek, and by the swinging of southerly dipping beds on Lightning Creek up-stream from Stanley to easterly and north-easterly dipping beds along Dry Gulch, Perkins Creek, and on Burns Mountain.

The structural lines on the accompanying map show an area of westerly striking and gently north-dipping rocks extending from Coulter Creek through the Slough Creek benches and up Devils Lake Creek and Burns Creek to Lot 10443c. Along Devils Lake Creek between Hong's siphon and the Public Works camp the rocks lie in an anticlinal nose pitching eastward at about 25 degrees.

In the area extending from the ridge west of the Public Works camp, along Oregon Gulch, Davis Creek, and Perkins Creek to Burns Mountain the rocks strike northerly, varying a few degrees either west or east, and dip at low to moderate angles eastward. There appears to be a minor swing in the formations on Burns Mountain from north-westerly striking rocks around the Perkins veins to northerly striking rocks near the summit.

The relation between the northerly striking and easterly dipping beds on Burns Mountain and the westerly striking and northerly dipping beds on Burns Creek is unknown. Moreover, the relation of the panel of northerly striking and easterly dipping beds west of the Public Works camp to the easterly pitching anticline to the east is unknown.

The north-westerly striking and south-westerly dipping beds on Anderson Creek swing around an anticlinal nose whose axial plane, west of Last Chance Creek, strikes about north 25 degrees east.

Along Lightning Creek between Stanley and Houseman Creek the beds for the most part are westerly striking and southerly dipping, but have local swings and contortions between Grub Gulch and Butcher Bench.

Drag-folds are a common feature of the rocks. For the most part the amplitudes of the folds observed are no more than a few tens of feet. It is thought that most of the drag-folds are related to the older deformation and some to the younger, but it was not always possible to distinguish between the two. The extremely variable direction and pitch of the drag-folds probably results from their being of two different ages and also reflects the extremely unsymmetric nature of the folding (*see* Plate IV B).

On lower Coulter Creek, the Slough Creek benches, and on the west side of lower Devils Lake Creek the pitch of drag-fold axes is about 10 degrees west; in the old Burns Creek placer pit, 10 degrees east; along the road in Devils Canyon east of the Public Works camp, from 10 to 25 degrees east; on Burns Mountain, 10 to 20 degrees south; on Van Winkle Creek, horizontal to 5 degrees east; in Spruce Canyon, 15 degrees south-east; and on Houseman Creek, 5 degrees south-east.

There is no direct evidence in the Stanley area regarding the ages of the two periods of deformation. The older folding and accompanying regional metamorphism

* *Geol. Surv., Canada*, Map No. 365, 1895.

has affected, in the Barkerville area, only the Cariboo series and is consequently pre-Mississippian in age. The second deformation, which is represented by the gentle open folds in the previously cleaved Cariboo schists, probably may be correlated with the gentle folding of the Slide Mountain series. If so, its age is younger than the Slide Mountain series and is indicated by Uglow (1926, p. 40) as being probably Jurassic. It may have been contemporaneous with the more severe folding of the Jurassic, Quesnel River group to the south-west.

FAULTS.

The rocks are cut by numerous faults, most of which trend 10 to 20 degrees east of north, and, of these, three major ones have been mapped. North-westerly, northerly, and north-westerly trending faults of small displacement were observed in various places. Strike-faults, possibly of small displacement, were seen. Their presence is difficult to detect, and, as with the other faults of small displacement, their extension is in most instances impossible to trace beyond the limits of the individual exposure in which they are seen.

On the eastern side of the area a major fault, trending about north 20 degrees east, is mapped from Last Chance Creek to Slough Creek bench near the south-west corner of Lot 10544C. The exposure on Slough Creek bench indicates that the fault has a steep easterly dip of about 80 degrees. Movement along the fault has resulted in the horizontal displacement for about 700 feet to the right of a south-easterly dipping limestone-bed on Last Chance Creek at the junction of its west branch. The actual amount and direction of movement on this or the two other major faults is unknown.

This fault, called the Last Chance-Nelson Creek fault, has been projected through the following points:—

(1) A 100-foot crushed zone exposed on the Slough Creek bench near the south-west corner of Lot 10544C.
(2) A straight 1,000-foot depression on the ridge-top near the north-west corner of Lot 10431.
(3) A point on the west branch of Oregon Gulch on Lot 10427 where a well-exposed 40-foot black argillite bed is abruptly terminated at its south-eastern end.
(4) An open-cut on the Acme group that exposes a strong gouge-zone.
(5) The upper stretch of Last Chance Creek, where dissimilar rocks outcrop on the two sides of the creek and where a limestone-bed at the junction of the west branch has been displaced about 700 feet southward.

A north-striking fault exposed in the Last Chance hydraulic pit during the course of work in the mid-thirties may be a branch strand of the major fault.

A second major fault, called the Grub Gulch-Coulter Creek fault, is believed to extend in a direction about north 15 degrees east from Grub Gulch to the lower part of Coulter Creek. An easterly dip of the fault is indicated by a 70-degree east dip of one of the fault-planes observed in Leo Bedford's hydraulic pit. The movement along it has resulted in the left-hand displacement of about 600 feet of a northerly dipping limestone-bed on lower Coulter Creek.

The right-hand displacement of the limestone-bed on Last Chance Creek and the left-hand displacement of the limestone-bed on Coulter Creek could be explained by postulating a downward relative movement of the block lying between the two faults.

The fault is projected between the following points, where evidence of its presence has been observed:—

(1) The displaced limestone-beds on lower Coulter Creek.
(2) The west end of the Ketch hydraulic pit, where a limestone-bed is terminated.
(3) Along lower Devils Lake Creek, where dissimilar rocks on each side of the valley are exposed.

(4) Leo Bedford's hydraulic pit on the west side of Devils Lake Creek, where, in 1946, a 6- to 8-foot fault-zone was exposed.

(5) Through two long, straight topographic depressions extending southward from the angle of Devils Lake Creek through the western part of Lot 10443C. These depressions were observed in several places on the ground and are particularly noticeable in vertical aerial photographs of that section.

(6) The fault is assumed to extend southward along the course of Perkins Creek near the north-west corner of Lot 10743C.

(7) Through Grub Gulch hydraulic pit, where a wide fault-zone was exposed during the course of operations in 1945 and 1946.

(8) Along Grub Gulch to the diversion-dam 800 feet below the upper Grub Gulch ditch, where strands of it were exposed in the autumn of 1946 when the footings of the new dam were being dug.

Small north-westerly striking faults exposed in the Estman hydraulic pit on the upper part of Perkins Creek in the north-west corner of Lot 10734C may be branches running off from the main fault.

A third major fault called the Butcher Bench-Burns Creek fault is assumed to run southward from the point where the Jack of Clubs flume crosses Burns Creek to the western end of Butcher Bench. The dip of the fault is unknown, and its direction and amount of displacement are not determinable with any degree of certainty. If, however, the calcareous beds by the flume crossing of Burns Creek correspond to the horizon of the limestone-beds at the west end of the Ketch pit, the indicated displacement would be to the right and of the order of 2,500 feet.

The fault is projected from the flume crossing of Burns Creek, where dissimilar rocks outcrop on the two sides of the creek through a long stretch of ground covered by overburden to a 5-foot fault-zone exposed in the western end of Butcher Bench. No evidence of the fault could be found in the heavily drift-covered tract between the two occurrences.

Small north-easterly trending faults exposed on Butcher Bench are evidently small branch strands of the main fault.

The projection of the fault northward from Burns Creek lies less than 500 feet east of the portal of the Bridge Island Gold Company's adit on upper Coulter Creek.

A strong fault striking about 10 degrees west of north and dipping 50 to 70 degrees east is exposed underground in the Foster Ledge adit on Lot 8897. This fault is expressed on the surface by a straight, prominent steep-sided gully about 1,000 feet long that coincides with the trace of the fault.

The Foster Ledge upper adit exposes a normal fault striking about 10 degrees east of north, almost parallel to the formation, and dipping 50 degrees east. The lateral displacement of the veins exposed in the adit indicates that the hanging-wall side has moved downward about 20 feet (*see* section on Fig. 6).

A strong topographic break trending about 10 degrees east of north and extending southward from the Public Works camp and to the east of Eric Rask's small hydraulic pit at the summit of Devils Lake Creek may follow a fault, but no geologic evidence is available to substantiate this assumption.

Rocks are well exposed along Devils Lake Creek between the Public Works camp and Hong's siphon. The sections exposed along the two sides of the creek do not correspond, despite the fact that attitudes on both sides are alike. This discrepancy might indicate the presence of a fault trending slightly north of east, but confirmatory evidence is lacking.

A north-easterly striking fault that dips 70 degrees to the north-west is indicated by 2 feet of gouge exposed on the north side of Spruce Canyon. The extension of the fault may be on Van Winkle Creek about 250 feet north of the intake of the lower Grub Gulch ditch. Other north-easterly striking faults are exposed in Dunbar Flat

hydraulic pit, but their movement, judging from the amount of gouge, is probably very small.

A fault striking north 12 degrees east and traceable for a length of 150 feet is indicated by from 2 inches to 2 feet of gouge exposed at the south-east end of the hydraulic workings on the Slough Creek bench.

A normal fault striking north 10 degrees east and dipping 40 degrees west is exposed along the road about 400 feet east of the Public Works camp. The indicated movement is about 25 feet.

The age of the faulting cannot be assigned with complete certainty. The major faults, however, cut across all the folded structures of the Cariboo series and do not appear to be folded themselves. If the age of the second folding of the rocks be correctly assigned to the Jurassic, then the major faulting in the area necessarily must be Jurassic in age or younger. This point cannot be proved by evidence available in the Stanley area, but in the area east of Barkerville, Uglow (1926, p. 40) indicates that at least some of the north-easterly trending tension faults are Jurassic in age.

Joints.

A noticeable feature of the area is the presence of a regionally developed system of joints. These fractures, though not developed to the same extent in all types of rock, are seen cutting all rocks and all folds in the bedrock. The joints, wherever seen, have a remarkably uniform strike, mainly of from north 10 to 25 degrees east, but a few strike as much as 35 degrees east of north, all have dips of 70 to 80 degrees to the west. Neither the distribution nor the attitude of the joints is related in any apparent way to the folds or foliation of the bedrock. They are, however, essentially parallel to the strike of the major faults of the area, though opposed in dip. The two were correlated by Uglow (1926, p. 36) in the Barkerville area.

In the Barkerville area Uglow (1926, p. 188) states that early formational quartz veins are crossed by north-easterly trending fractures. These latter appear comparable to the regional joints in the Stanley area. The joint fractures in places, as on the ridge west of the Public Works camp, near the north-east corner of Lot 10443C, and on the ridge west of the north-east corner of Lot 10730C, are occupied by quartz veinlets a fraction of an inch wide, which, where spaced closely enough, have silicified the quartzite host rock. Elsewhere, as in the Foster Ledge workings and on Burns Mountain, the joint fractures are occupied by quartz veins mineralized with pyrite, galena, sphalerite, and gold.

The jointing is prominently developed in rocks exposed in the Slough Creek benches, on the ridge west and north-west of the Public Works camp, in the north-east corner of Lot 10443C, west of the north-east corner of Lot 10730C, on Oregon Gulch and Burns Creek, on Burns Mountain, and in the Ah Quay hydraulic pit.

In many places natural rock walls are observed to be parallel to the joint planes. It is probable that some of the small, straight north-north-easterly trending gullies, particularly in any place where the trend of the gully crosses the strike of the bedrock, may have been eroded along zones of closely spaced north-north-easterly trending joints.

The origin of the regional joints is not clear. They are not perpendicular to the axes of the folds of either age and cannot be considered as extension joints related to the folding. They are more or less parallel to the strike of the major faults, though their westward dip is opposed. Uglow (1926, p. 36) correlated the two, but in the Stanley area it cannot be demonstrated that joints are more abundant nearer the faults than elsewhere. Neither can it be shown that on the Acme group and on Burns Mountain, where a second direction of fracturing is present, that the two systems of fracturing are conjugate sets related to the major faults. Nevertheless, their origin is important because of its bearing upon the localization of fractures which in several instances have been mineralized with gold-bearing quartz.

CHAPTER IV.—ECONOMIC GEOLOGY.

QUARTZ VEINS.

General Characteristics of the Veins.

In the Stanley area, as in many other parts of the belt occupied by the Cariboo series, quartz veins are of fairly frequent occurrence. For the most part, the veins are short and narrow, their average width being less than 12 inches.

In the Barkerville area it has been shown that quartz veins fall into two groups. "A" veins are those that are parallel to the strike of the rocks. They include formational veins, tnose that are parallel to the dip, and strike-fault veins that cut across the dip of the rocks. " B " veins include all veins that cut across the strike of the rocks. Most " B " veins there are either north-easterly trending, called transverse or horsetail veins, or easterly trending, called diagonal veins.

Quartz veins in the Stanley area fall into the two major groups, but the " B " veins do not have the same directional groupings represented by the transverse and diagonal veins of the Barkerville Gold Belt.

"A" Veins.

Formational quartz veins are of common occurrence. Most of them are only a few inches in width or at the most about 2 feet; they are characteristically lensy and only a few tens of feet long. The quartz frequently contains ankerite or siderite as a narrow selvage along the walls and rarely is seen to contain pyrite or any other sulphide mineral. No formational veins carrying gold values are known in the area. Commonly, the formational vein quartz is fractured and consequently may be older than the quartz of the " B " veins.

No strike-fault "A" veins were seen.

"B" Veins.

The prominent regional fracturing of the area strikes north 10 to 30 degrees east and dips steeply to the west. In many places fractures of this system are occupied by vein-quartz. These quartz veins are the most frequently observed of the " B " veins. The veins may be but a fraction of an inch in width and serve only to silicify the adjoining rock or may be a few inches to several feet in width and be sufficiently well mineralized to induce exploration and some development. Veins of this type include the Perkins veins on Burns Mountain, the Foster Ledges and other veins on Oregon Gulch, the veins on the Acme group north of Stanley, and numerous others.

The widest veins of this type are those exposed near the summit of Burns Mountain on Lots 62 and 63, where maximum widths of 4 to 5 feet are reached. Most of the veins are less than 2 feet in width, and many of them range from 1 to 6 inches in width. The vein-quartz generally is unfractured, though this is not universally true. The quartz may be mineralized with ankerite, which generally appears as a narrow selvage along the walls, with pyrite either as sparsely disseminated grains or small irregular masses, and with galena, sphalerite, and free gold. Not all veins contain sulphide mineralization, and the mineralization where present is generally sparse. Of the many veins sampled, assays of more than a few hundredths of an ounce of gold per ton were obtained mainly from " B " veins of this type.

A group of westerly striking veins on the Acme group and a group of north-easterly striking veins on Burns Mountain are associated in both places with north-north-easterly trending " B " veins. These are the only two sets of vein fractures that might correspond to the transverse and diagonal veins of the Barkerville Gold Belt.

Other " B " veins, with attitudes different from those of the regional type, are to be seen at the north-east corner of Lot 1684c, in the Ketch pit, in Spruce Canyon, in the Cariboo Ledge workings, and elsewhere. These veins show no regularity of strike

and dip and cannot be grouped into any fracture system on the basis of their attitude. Widths of quartz in these " B " veins may reach as much as 6 feet, and in general they are wider than the north-north-easterly striking veins. For the most part, the quartz is devoid of sulphides or only sparsely mineralized with pyrite, galena, and more rarely sphalerite. Sampling of these veins, wherever seen, reveals that they contain little gold, if any (*see* Table IX, p. 57).

Mineralogy.

The mineralogy of the veins is simple. The quartz is milky in appearance, usually only slightly fractured, if at all, and may in places contain a few small crystal-lined cavities. Ankerite or siderite* is a common, but not universal, constituent of the veins. It may occur as small masses or disseminated grains, and frequently forms narrow selvages along the vein-walls. An analysis of ankerite† from quartz-pyrite veins in the long crosscut driven by Burns Mountain Gold Quartz Mines, Limited, on the south side of Burns Mountain is: $FeCO_3$, 65.6 per cent.; $CaCO_3$, 1.4 per cent.; $MgCO_3$, 29.9 per cent.; and $MnCO_3$, 3.2 per cent.

Pyrite is the commonest of the sulphides and is present, in exceptional instances, in amounts ranging up to half the vein, but the average pyrite content is less than 5 per cent. The pyrite may be present as irregular masses ranging up to several inches across, but more frequently occurs in small individual crystal grains or clusters of crystals. The cubical pyrite crystals generally measure less than one-quarter of an inch along their edge, but may reach half an inch or larger. Pyritization of the wall-rock frequently accompanies pyrite-bearing quartz veins, and fairly abundant coarse cubical crystals are developed in the wall-rock for several inches or considerably greater distances away from the veins. The intensity of the pyritization of the rock appears to depend on the number of and degree of mineralization of the adjacent quartz veins.

Galena in small amounts accompanies pyrite in several of the Perkins veins on Burns Mountain, in the Foster Ledges and several other small veins in Oregon Gulch, in veins on the Acme group, and elsewhere.

Sphalerite, subordinate in amount to the accompanying pyrite and galena, is present in the Foster Ledges at the forks of Oregon Gulch, and in the vein-segment in the fault-zone exposed in a hydraulic pit near the west end of the Slough Creek bench close to Nelson Creek.

Free gold has been seen in quartz from the dumps of the Perkins veins on Burns Mountain, in the veins on the Acme group north of Stanley, and has been reported from the Foster Ledges at the forks of Oregon Gulch. The Perkins veins produced several spectacular specimens of free gold in quartz variously reported to be valued between $30 and $120 (Johnston and Uglow, 1926, p. 209).

The gold in specimens from the Perkins veins and the veins on the Acme group is most frequently seen either in cubical cavities from which pyrite has been completely leached or in cubical masses of limonite resulting from the oxidation of pyrite, and more rarely in quartz that is otherwise unmineralized. Most of the gold seen in vein specimens or recovered by panning oxidized vein material is very small, considerably smaller than the bulk of the fine gold recovered in placer operations.

Mineralog'c Association of Gold.

The variable mineralogic association of gold is shown by the following tabulated assay results (*see* Table I):—

* The composition of the vein carbonate has not been investigated. It is, in this report, called ankerite.

† This material, a magnesian siderite, is more properly called pistomesite.

Table I.—Relation of Gold and Silver Assays to Mineral Content of Veins.

Location.	Pyrite.	Galena.	Sphalerite.	Gold.	Silver.
Group 1.	Per Cent.	Per Cent.	Per Cent.	Oz. per Ton.	Oz. per Ton.
Burns Mountain, long crosscut	50	.....	.....	0.86	*Nil*
Burns Mountain, long crosscut	100	.....	.....	4.00	*Nil*
Burns Mountain, long crosscut, pyritized wall-rock	100	.....	.....	0.08	*Nil*
Burns Mountain, Reid adit	90	.....	.....	1.06	*Nil*
Burns Mountain, Perkins vein dump	50	.....	.....	2.86	1.6
Group 2.					
Rask hydraulic pit—vein	35	.....	.....	*Nil*	*Nil*
Bridge Island Golds, Ltd., vein material from dump	30	.....	.....	Trace	*Nil*
Nelson Creek quartz float	20	.....	.....	*Nil*	*Nil*
West fork of Last Chance Creek, float	25	.....	.....	Trace	Trace
Group 3.					
Acme group, surface cuts	.....	95	.....	0.01	32.9
Foster Ledge, galena vein	.....	Solid	.....	Trace	31.6
Foster Ledge, main adit	*	*	50	0.07	0.7
Foster Ledge, main adit	10	.....	.....	0.06	0.4
Foster Ledge, main adit	†	2	.....	0.02	1.0
Foster Ledge, main adit	†	.....	6	0.01	*Nil*
Group 4.					
Grub Gulch, galena pebble	.....	80	.....	8.05	32.8
Grub Gulch, galena pebble	.....	90	.....	0.72	113.4
Grub Gulch, galena pebble	.....	80	.....	Trace	8.0

* Less than 5 per cent. † Small amount.

The assays in Group 1 of Table I, of samples taken from veins on Burns Mountain, show the association of high gold values with pyrite, even though no gold is visible. There is no direct relation between the gold content and the amount of pyrite. It is significant that coarse pyrite, in cubes half an inch square from the wall-rock, contains a small gold content. Although experience in Island Mountain and Cariboo Quartz mines supports the belief that high gold values are associated with fine-grained pyrite rather than coarse, no evidence of this relationship in the Stanley area was observed.

The assays in Group 2 of Table I, from samples of quartz well mineralized with pyrite, indicate that some pyrite is completely barren of gold. Though these samples were from "B" veins, they were not from veins of the north-north-easterly trending group.

The assays in Group 3 of Table I indicate that veins with high galena or sphalerite and little or no pyrite contain very low gold values, but may contain moderate amounts of silver that is associated with the galena.

However, the assays in Group 4 of Table I, from clean galena pebbles from the Grub Gulch hydraulic pit, show that even almost pure galena may contain high gold values. These pebbles were smooth and well rounded and were specially selected to avoid accidental salting with placer gold. No visible gold was present. Galena specimens from other parts of the Cariboo have been seen containing wires and thin leaves of gold.

Fineness of Lode Gold.

During the course of work, samples containing gold were collected in order to determine the true fineness of the lode gold. Three specimens containing visible gold were collected on Burns Mountain—one from the dump on the shallow workings on the main Perkins vein, two others from piles of quartz near the cabin that presumably came from the Perkins veins. One specimen was obtained from surface cuts on the Acme group north of Stanley. No visible gold was seen in the vein exposed underground in the Reid adit, and the sample taken there is of picked pieces of clean pyrite, containing no visible gold, from the vein. Because bad air, starting about 700 feet in from the portal, makes the long crosscut of Burns Mountain Gold Quartz Mining Company on

the south side of Burns mountain inaccessible, samples were collected from the dump. They are believed to be from veins intersected near the end of the crosscut, in the part directly beneath the Reid adit and surface workings. The samples were of specially selected pieces of clean pyrite separated from vein quartz.

Tabulated results follow:—

Table II.—Fineness of Lode Gold.

Location.	Description.	Fineness of Gold smelted from Pulverized Sample.	Fineness of Metallic Gold separated from Sample.
		Parts Gold per Thousand.	Parts Gold per Thousand.
1. Burns Mountain (main Perkins vein)	Gold specimens from rusty quartz (dump from shaft)		840±13
2. Burns Mountain (Perkins vein)	Gold specimens from rusty quartz (near cabin)		888±2.3
3. Burns Mountain (Perkins vein)	Gold specimen from rusty quartz (near cabin)		916±2.4
4. Burns Mountain long crosscut—dump	Selected clean, unoxidized pyrite	−100 mesh 850±30 880±30 890±30	+100 mesh 923±4
	Same sample	−100 mesh 870±30	+60 mesh 891±1 +100 mesh 880±10
		Av. 870±30	Av. probably 890
5. Burns Mountain—Reid adit	Selected clean unoxidized pyrite	−100 mesh 680±25 700±25 700±25	+100 mesh 914±4
	Same sample	720±25	+60 mesh 850±10
	Same sample	680±25	+60 mesh 780±75
		Av. 700±25	
6. Acme group	Gold specimen from rusty quartz in open-cut		927.4±0.6

There is a wide range of variation in the true fineness of gold from samples from the Perkins veins on Burns Mountain. The three samples showing visible gold, Table II, Nos. 1, 2, and 3, although their numerical average is about 880 fine, contain 840±13, 888±2.3, and 916±2.4 parts gold per thousand.* No visible gold could be found in the vein exposed in the Reid adit. The vein is beneath the surface workings on the Perkins veins and is either one of the same veins or a vein occupying a parallel fracture. The sample, No. 5, was cleanly picked pyrite from a point in the Reid adit about 75 feet below the surface. The sample was crushed and split, half was pulverized to pass through a 60-mesh screen and half to pass through a 100-mesh screen. The fineness of the gold scales caught on the 60-mesh screen is 850±10 parts per thousand and that on the 100-mesh screen 914±4 parts per thousand. The pulp was smelted and the contained gold collected. The average of five determinations of the fineness of the resulting gold beads was 700±25 parts per thousand. In this one sample the gold shows a very wide variation in fineness. In it the metallics separated differ not only from each other but from the gold contained in the −100-mesh pyrite pulp. It would appear that in this one sample the gold fineness might be related to the size of the gold particles. Alternatively, it is possible that through chemical action the gold, after its deposition in the vein, has been progressively increased in fineness from original lode gold having a fineness of 700±25 through intermediate stages, one represented by a fineness of about 850, to a fineness of 914±4.

* In these and succeeding figures the difference between the gold fineness and a thousand is silver content. These are true fineness figures determined from a bead uncontaminated with base metals; no platinum group metals are present.

Sample No. 4 from the Burns Mountain long crosscut represents pyrite from the Perkins set of veins at a depth of about 275 feet beneath the surface. It was treated in exactly the same manner as No. 5. In it, however, the finenesses of the +60- and +100-mesh gold flakes check reasonably closely, averaging about 890 parts gold per thousand. Also there is a reasonably close correspondence between the metallics and the average of five determinations of the fineness of the gold in the —100-mesh pyrite pulp of 870±30 parts per thousand.

Further investigation of the variation in the fineness of the lode gold from the main Perkins vein was impossible because of the absence of reliable specimen material. That the fineness of gold from an individual vein and even from an individual stope may vary widely is reported in the Alleghany District, California, by Ferguson and Gannett.* In the Kolar goldfield in India gold fineness variations of considerable latitude, as reported by Pryor (1924, p. 110), are related to depth on the lode, gold of progressively higher fineness being obtained at deeper levels on the vein system. The variations of the lode gold from Burns Mountain do not fall into a regular pattern. They may be explained on the hypothesis either that they represent differences in the fineness of the original gold as deposited, or the hypothesis that wholly or partly they represent changes brought about by the differential solution and redeposition of gold and silver in the zone of oxidation at and near the surface outcrops of the veins. The necessary manganese for chemical reactions of this type could be supplied by the manganiferous ankerite, such as is represented by the material analysed from the Burns Mountain long crosscut (*see* p. 26).

Sample No. 6 is a specimen containing visible gold in rusty quartz from one of the north-north-easterly striking veins exposed at the surface on the Acme group. The gold in it has a fineness of 927.4±0.6 parts per thousand.

Spectrochemical analyses made of samples No. 2 and No. 6 in Table II to determine if any minor elements were present in characteristic amounts did not show any significant differences between the two. The tabulated results follow:—

Sample.*	SiO_2.	Fe_2O_3.	MgO.	Al_2O_3.	Au.	Ag.	Cu.	Pb.	Hg.
No. 2	100.0†	2.5	25.7	.....	33.3	5.8	5.2	3.6	16.5
No. 6	101.7	1.9	19.8	.....	30.2	6.1	4.5	1.7	12.9

Ni, Ti, Cr, Bi, Sb, Co, Zn, Mn not present in either sample.

* Each sample weighed 10 milligrams and 50 per cent. of the light emitted was used to produce a spectrogram. Each sample was treated for five minutes in hot 1:2 hydrochloric acid, decanted, washed, and then treated with hot 1:2 nitric acid for five minutes.

† Figures in the table are spectral line intensities and are directly proportional to the amount of metal in the sample. They are subject to an error of about 15 per cent.

Undoubtedly a large part of the silica represents contamination of the sample by the quartz gangue.

Geologic Distribution of Auriferous Veins.

Quartz veins in the Stanley area are not only widely distributed areally but occur in rock-types of a considerable variety. The Foster Ledge veins in Oregon Gulch and the Perkins veins on Burns Mountain are in a series of fairly thinly bedded quartzites and argillaceous schists; the Acme group veins are in hard, fairly thickly bedded light-grey quartzites; the Cariboo Ledge veins are in sheared quartz pebble conglomerate; veins on the Eldorado claim (Lot 11350) and on Lot 1685c at the head of Olally Creek are in black argillaceous quartzite, and in Spruce Canyon there are short veins in chlorite schist. "B" veins such as these are scarce in soft, thinly fissile micaceous schist, but amongst the harder more quartzitic types it cannot be demonstrated that any one particular rock-type contains more veins than another. In this regard the area differs from the Barkerville Gold Belt, where the greatest number of veins occur in a single rock unit, the Rainbow member.

* *U.S. Geol. Surv., Prof. Paper 175*, p. 51, 1932.

Auriferous veins, of which those on Burns Mountain, the Foster Ledge veins on Oregon Gulch, and on the Acme group are the main representatives, occupy north-north-easterly striking and steeply westward-dipping fractures which belong to a regional system of jointing. Not all fractures of this system are mineralized with quartz, and of the quartz veins not all are mineralized with gold.

The fracture system, widely developed as it is and cutting across all folded rocks regardless of their pitch, may have accompanied the formation of the generally parallel but east-dipping major faults. On the Acme group there is a second set of east-striking vein-filled fractures which together with the north-north-easterly striking ones might constitute a conjugate fracture system associated with the near-by Last Chance-Nelson Creek fault. The relationship of a group of east-north-easterly striking veins on Burns Mountain to the north-north-easterly trending veins there is not known. Elsewhere no other associated fracture directions have been observed. Moreover, it is not possible to state with assurance that the regional fracturing is more abundant as the major faults are approached. The origin of the fracturing has not been definitely established. Consequently, the genetic association of auriferous veins and north-easterly striking faults, such as exists in the Barkerville Gold Belt, cannot be closely established, despite the fact that the gold-bearing veins on the Foster Ledge and on the Acme group are close to, and just east of, the Last Chance-Nelson Creek fault, and that the Perkins veins on Burns Mountain are fairly close to, and just east of, a fault projected between Butcher Bench and Burns Creek.

Age of Gold Mineralization.

The gold-bearing quartz veins occupy fractures, many of which belong to the regionally developed joint system. These fractures cut across all the folds in the Cariboo series. If these fractures are genetically related to the major faults, thought to be Jurassic in age or younger (*see* p. 24), then the period of gold mineralization necessarily must be of comparable age, rather than pre-Mississippian as previously considered (Johnston and Uglow, 1926, p. 191). Such an age would link the gold mineralization of the Central Cariboo with that of the gold-bearing veins on Cedar Creek and in the Little River area and with the mineralization that presumably was the source of the gold placers on Stewart, Cafe, and Big Valley Creeks, where the Slide Mountain series outcrops, and on Mosquito Creek and Quesnel River where rocks of the Quesnel River group outcrop.

PLACER DEPOSITS.

General Character of Placer Deposits.

Placer deposits in the Stanley area have been mined from Lightning Creek, Slough Creek, and certain of their tributaries. Few deposits now remain unworked and only a few placer operations still persist.

The gold-bearing gravel lay largely on bedrock. In many instances it was at considerable depth below creek-level and was overlain by glacial material. In others it rested on bedrock benches along the sides of and above the level of the present creeks or, in some tributary creeks, lay at shallow depth on bedrock in the creek-bottom. It is thought that the gold was initially concentrated in preglacial time in the bedrock gravels of streams flowing in the same valleys as the present, but at somewhat higher elevations. In preglacial or possibly in interglacial time renewed downward erosion on Lightning and Slough Creeks lowered the creek-bottoms and reconcentrated the gold from the earlier channels, remnants of which were left along the sides. The area was covered with ice during the Pleistocene, but little bedrock erosion and dispersion of gold in the creek-bottoms took place. The valley slopes were covered with glacial drift up to several tens of feet thick and the creek-bottoms filled with drift to heights of several hundred feet above the valley-bottom. Since the disappearance of the ice, creeks have reoccupied the old valleys and have cut down through and excavated much

of the valley-fill. In the main valleys of Lightning and Slough Creeks, however, the present creeks have not yet cut down to bedrock and are flowing on top of a considerable thickness of drift. On the lateral tributaries, depending upon the thickness of the drift and upon the longitudinal profile of the creeks, the creeks may be flowing on bedrock along part of their course and upon a variable thickness of drift along the remainder. Postglacial streams, through the erosion of glacial material in which some gold-bearing gravel has been incorporated or through the erosion and concentration of gold-bearing gravel in earlier-formed stream deposits, have concentrated gold on bedrock and in shallow surface gravels lying on glacial drift.

The gold-bearing gravel lying on bedrock below the level of Lightning Creek has been mined from LaFontaine shaft, below the mouth of Anderson Creek, up-stream to the foot of the canyon below the junction of Houseman Creek (*see* accompanying map, also Fig. 1). The depth of bedrock below creek-level is indicated by the depths of the various working shafts: LaFontaine, 165 feet; Costello, 100 feet; Vulcan, 90 feet; lower Victoria, 72 feet; upper Van Winkle, 60 feet; and Ross, 36 feet. The deep channel of Lightning Creek extends eastward from the Edinburgh tunnel, but in that section was not profitable and has not been mined. Lightning Creek itself swings north-eastward and flows on bedrock in a canyon below the mouth of Houseman Creek. Shallow gravel was mined in the creek in the canyon section.

Bedrock benches along the sides of Lightning Creek, representing one or more of the earliest levels of the creek, were mined on the south side of the creek, extending down-stream from Last Chance Creek past Ah Quay Creek, on the south side between Grub Gulch and Van Winkle Creek, on Nason Point, Kelly Point, Butcher Bench, on benches on the north side of the creek up-stream from the mouth of Amador Creek, and at Dunbar Flat.

The lower stretches of certain tributaries, such as Anderson, Davis, Last Chance, Chisholm, and Perkins Creeks, are graded to the deep bed-rock level of Lightning Creek. Consequently, drifting ground lying below creek-level and worked from shafts existed at their mouths and for some distance up-stream. Others, such as Grub Gulch, Van Winkle, Amador, and Houseman Creeks, were graded initially to a level of Lightning Creek higher than the present. Upon rejuvenation of Lightning Creek these tributaries did not maintain a profile graded to the deep level of Lightning Creek, and at short distances back from their mouths bedrock in these creeks is at or above the present level of Lightning Creek. Consequently, bedrock gravel near the mouths of these creeks was found that could be worked by hydraulicking or drifting from adits.

Deeply buried gravel at the mouth of Anderson Creek was prospected or mined from a shaft near the mouth of the creek. Up-stream, gravels were washed fairly extensively as far as the top of the Trelease workings near the south-west corner of Lot 11404, beyond which scattered shallow workings extend almost to the intake of the Jones ditch leading to Donovan Creek. Shallow gravel is being worked on the west branch of Anderson Creek by Emil Falck.

Deeply buried bedrock gravel at the mouth of Davis Creek was mined from an old low-level drift. Up-stream, as the bedrock of the creek rose above Lightning Creek, bedrock gravel beneath 25 feet and more of boulder-clay was hydraulicked. The top end of the worked section of Davis Creek is on the east branch 400 feet north-east of the north-west corner of Lot 1670.

A hydraulic pit extending about 1,300 feet south on Ah Quay Creek was worked to bedrock that rises above a bedrock bench extending along the south side of Lightning Creek.

Most of the deeply buried gravel at the mouth of Last Chance Creek was mined from shafts. A small remnant of unworked ground, possibly a bench flanking the channel, was found recently by Alf Brown, of Stanley, through drilling. He has sunk a shaft about 500 feet south of Lightning Creek, from which he proposes to drift the bedrock gravel. The lower section of Last Chance Creek, including a section pre-

viously drifted, was hydraulicked south almost to the south-west corner of Lot 11418. South of that point, old shallow placer-diggings extend up-stream for about 3,500 feet, about 1,800 feet up-stream from the junction of the west branch.

Deeply buried pay-gravel at the mouth of Chisholm Creek probably was mined from the Vulcan shaft on Lightning Creek. Considerably farther upstream from there, gravel beneath several hundred feet of boulder-clay was reached from the Snowden shaft, said to be 203 feet deep, but the gravel was not profitable to mine. Extensive mining of less deeply buried gravel was continued up Oregon Gulch, from near its junction with Chisholm Creek. The workings extend up the west branch to the south-west corner of Lot 10429 and up the north branch 600 feet north of the south boundary of Lot 10429. Most of the work was done by Chinese miners.

Old placer-workings, some in shallow gravel, and some drift-workings extend up Perkins Creek above the crossing of the Lightning Creek road. A fairly extensive hydraulic pit was worked by Felker and Sparkes on a bedrock bench lying east of the creek on the western half of Lot 10743c. The limit of the placer-workings on the creek is at the head of the Estman hydraulic pit at the southern boundary of Lot 10735c.

A hydraulic pit in recent years has been advanced up-stream on Grub Gulch for about 900 feet above its junction with Lightning Creek. A few old shallow workings and test-holes extend for a few hundred feet beyond the present limits of the pit.

Gold-bearing gravel on bedrock at shallow depth was worked at the mouth of and up-stream on Van Winkle Creek as far as the intake of the lower Grub Gulch ditch. Some hydraulicking was done just up-stream from the intake of the lower Grub Gulch ditch, and old placer-workings extend beyond almost to the intake of the upper Grub Gulch ditch, about 4,000 feet south of Lightning Creek.

Deeply buried bedrock gravel was worked at the junction of Amador and Lightning Creeks, but no workings, other than prospect shafts, extend up-stream on Amador Creek beyond the falls near its mouth.

Bedrock gravel on Houseman Creek, buried beneath a considerable thickness of glacial material, was drifted up-stream to a point about 1,200 feet from the junction with Lightning Creek. Later, a hydraulic pit has been advanced north-eastward up Houseman Creek for 1,700 feet up-stream from its mouth.

Slough Creek is flowing on top of an accumulation of valley-fill which is known to have a maximum depth of about 287 feet. An unsuccessful attempt at mining the bedrock gravel opposite the mouth of Nelson Creek was abandoned because of inability to drain the gravel or to reduce the high water-pressure. There has been no other mining of bedrock gravel in the bottom of Slough Creek.

Gold-bearing gravel lying on bedrock benches extending along the south side of Slough Creek between Burns Creek and Nelson Creek has been worked extensively. The benches, from which the gold-bearing gravel has been mined, slope upwards to heights of 100 feet and more above the present level of Slough Creek. Hydraulic operations have exposed wide areas of bedrock which were formerly covered by gold-bearing gravel overlain by several tens of feet of boulder-clay and glacial materials.

Placer-ground at comparatively shallow depth has been mined extensively in the lower 2,000 feet of Nelson Creek, and old shallow workings extend up-stream for several thousand feet.

Shallow gravel on bedrock was mined on Coulter Creek down-stream from the foot of the canyon about half a mile above its mouth. Above the canyon, bedrock gravel of an old channel buried beneath boulder-clay up to 150 feet thick has been hydraulicked.

Devils Lake Creek has been mined at various places from the old shaft sunk at its mouth up-stream to its head at the divide into Chisholm Creek. Two small hydraulic operations continue, one high on the west side just north of Hong's siphon and the other on shallow bedrock near the divide into Chisholm Creek.

Bedrock gravel at the mouth of Burns Creek was drifted in the lower part and hydraulicked farther up-stream. Shallow placer-workings extend up the creek almost to the southern boundary of Lot 10440c.

Further descriptions of the above-mentioned creeks and accounts of much of their early mining will be found in *Geol. Surv., Canada*, Memoir 149, 1926, pp. 136–174.

Placer Production and Distribution of Placer Gold.

The total placer-gold production of the Stanley area is not definitely known. The production for the first few years after the initial discoveries in 1861 was very large, but no recorded production figures are available for the period before the establishment of the Department of Mines in 1874. Since 1874, estimates of the annual gold production have been made by the Gold Commissioner, but in many instances the production of individual creeks has not always been recorded separately. Since 1925, recorded gold-production figures are based on the Gold Commissioner's estimate of production combined with the annual production figures obtained from the operators.

The value of the gold production of the Lightning Creek section, including upper Lightning Creek and its tributaries, was estimated by Johnston (1926, p. 172) to have been between $5,000,000 and $6,000,000. This was based on the best available recorded information, together with information obtained from "old-timers" living at that time. It is thought by some that the production was a good deal greater, and Bowron, who from 1872 to 1906 was Mining Recorder and Gold Commissioner at Barkerville, thought that the production amounted to about $12,000,000,* but this higher estimate cannot be supported by figures of known production.

The recorded production of the Lightning Creek section since 1874 is valued at $1,992,845 from 104,931 oz. of crude gold (*see* Table IV). This must be considered as a minimum value, inasmuch as records for some creeks in various years are not available.

Table III, based on gold-production figures published in the Minister of Mines Annual Report for 1875, shows the production of certain Lightning Creek claims to November, 1875, as $2,179,272. A calculation based on Table III and Table IV makes it apparent that the production from these claims before 1874 was valued at $1,260,558.

Table III.—Production of Lightning Creek Placer Claims to November, 1875.†

Campbell and Whitehall	$200,000
Dutch and Siegel (now Perseverance)	130,000
Dunbar	30,000
Lightning	153,962
Discovery and Butcher	120,000
South Wales	141,531
Spruce	99,908
Point	136,625
Van Winkle	363,983
Victoria	451,642
Vancouver	274,190
Vulcan	56,955
Costello	20,476
	$2,179,272
Production of Lightning Creek claims in 1874 and 1875 (*see* Table IV)	918,714
Production of Lightning Creek claims before 1874	$1,260,558

In addition to the production of Lightning Creek indicated above, Van Winkle Creek produced a very large amount of gold for several years after discovery and

* Letter of J. Bowron dated September 13th, 1898, in the Provincial Archives, also *Minister of Mines, B.C.*, Ann. Rept., 1899, p. 631.

† *Minister of Mines, B.C.*, Ann. Rept., 1875, p. 11.

Last Chance Creek produced gold at least to the value of $250,000 in the lower half-mile. Undoubtedly a very large amount of gold was produced between 1861 and 1874, of which no records are available.

Table IV tabulates the production of Lightning Creek and its various tributaries from 1874 to 1945. Before 1925 the production recorded was the Gold Commissioner's estimate in dollars. Production since 1925 has been derived from information obtained from the placer operators combined with the Gold Commissioner's estimate. The estimate since 1925 has generally been as ounces of crude gold produced. In compiling Table IV the conversion of dollars to ounces of crude gold or vice versa is made using a conversion factor of dollars per ounce that is based on the fineness of the gold and is not necessarily the amount paid by gold-buyers for the gold. Since 1932 the value of crude gold is calculated using a factor derived from the value of fine gold as published in Table II of the Annual Reports of the Minister of Mines. The table represents the best production information available but cannot be taken as the exact or whole production.

Placer gold was mined from bedrock workings on Lightning Creek between the mouths of Anderson and Houseman Creeks. The extraordinarily rich ground, however, extended down-stream from the mouth of Van Winkle Creek through the Van Winkle, Victoria, and Vancouver workings almost to Stanley. That stretch of about 8,000 feet yielded a very large proportion of the total gold, and ground running as high as 50 and 78½ oz. per 8-foot set was mined.* The gold was coarse, ranging up to nuggets of 6 oz. weight. The largest nugget found in the Cariboo,† weighing 30$\frac{1}{16}$ oz.,‡ was found on Butcher Bench, about 3,000 feet up-stream from the mouth of Van Winkle Creek.

Down-stream from this stretch the gold content of the bedrock gravel became progressively less and the gold became smaller in size.

Last Chance and Van Winkle Creeks, tributaries on the south-west side of Lightning Creek, were the two most productive tributary creeks. The other creeks were mined and yielded varying amounts of gold, but were not of the same degree of richness as Last Chance and Van Winkle. Amador Creek, through some unusual set of circumstances, was not gold-bearing and was not mined, except at its very mouth.

Since 1874 the recorded placer-gold production of the Slough Creek section (*see* Table V) is valued at $1,282,176 from 61,100 oz. of crude gold. The greater proportion of this has come from the Slough Creek benches, between Nelson and Burns Creeks, where the gold was first discovered by Chinese miners in 1881.§

There are no records of production before 1874, but during that early period, starting in 1861, a considerable amount of gold was produced from Nelson and Burns Creeks. It is recorded‖ that "Nelson Creek is claimed to have produced over $3,000,000; this is probably a high estimate, but the amount was certainly very large." Nothing is known of the early production from Burns Creek, except that mining started in the early sixties and that drifting for a short stretch along the lower part of the channel was in ground running up to 25 oz. to the set. Later, hydraulicking along the channel was continued for many years.

It is possible that the total production of the Slough Creek section is in excess of $3,000,000.

Table V tabulates the recorded placer-gold production of Slough Creek and its tributaries from 1874 to 1945. The sources of information are similar to those of Table IV. It is incomplete and subject to error, but represents the best information available.

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* *Minister of Mines, B.C.*, Ann. Rept., 1902, p. 63.

† F. J. Tregillus, of Barkerville, says that the father of W. M. Hong, of Barkerville, told him that a Chinese miner found a 41-oz. nugget on the left fork of Jawbone Creek. The nugget was never shown locally because the finder shortly left for China.

‡ Letter, dated June 18th, 1864, of P. O'Reilly, Gold Commissioner at Richfield, to the Colonial Secretary, in Provincial Archives.

§ *Minister of Mines, B.C.*, Ann. Rept., 1881, p. 393.

‖ *Minister of Mines, B.C.*, Ann. Rept., 1902, p. 96.

Table IV.—Recorded Placer-gold Production of Lightning Creek Section, 1874–1945.

Year.	Lightning Creek.		Anderson Creek.		Ah Quay, Dry Gulch, and Boulder Creek.		Chisholm, Timon, and Donovan Creeks.		Chisholm Creek.		Last Chance and Davis Creeks.		Last Chance Creek.		Davis Creek.		Perkins Creek.		Van Winkle Creek.		Perkins and Van Winkle Creeks.		Grub Gulch.		Butcher Bench.		Mouth of Amador Creek.		Dunbar Flat.		Hoseman (Eagle) Creek.	
	Ounces.	Value.	Ounces.	Value.	Ounces.	Value.	Ounces.	Value.	Ounces.	Value.	Ounces.	Value.	Ounces.	Value.	Ounces.	Value.	Ounces.	Value.	Ounces.	Value.	Ounces.	Value.	Ounces.	Value.	Ounces.	Value.	Ounces.	Value.	Ounces.	Value.	Ounces.	Value.
		$		$		$		$		$		$		$		$		$		$		$		$		$		$		$		$
1874	21,910	405,187	.....	.....	.....	.....	.....	.....	65	1,200	190	3,500	.....	.....	.....	.....	.....	.....	.....	.....	190	3,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1875	27,800	513,527	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	540	10,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1876	8,100	150,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1877	9,500	176,000	.....	.....	.....	.....	.....	.....	47	875	.....	.....	70	1,300	224	4,124	54	1,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1878	3,410	63,196	.....	.....	.....	.....	.....	.....	83	1,535	.....	.....	16	300	75	1,400	94	1,744	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1879	387	7,160	.....	.....	.....	.....	.....	.....	97	1,800	.....	.....	51	945	297	5,500	97	1,800	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1880	1,370	25,400	.....	.....	.....	.....	.....	.....	54	1,000	.....	.....	72	1,340	58	1,080	27	500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1881	495	9,146	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	135	2,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1882	783	14,500	.....	.....	.....	.....	.....	.....	108	2,000	.....	.....	54	1,000	270	5,000	43	800	81	1,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1883	378	7,000	.....	.....	.....	.....	.....	.....	135	2,500	.....	.....	81	1,500	243	4,500	.....	.....	54	1,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1884	405	7,500	.....	.....	.....	.....	.....	.....	216	4,000	.....	.....	27	500	108	2,000	108	2,000	54	1,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1885	810	15,000	.....	.....	.....	.....	.....	.....	.....	.....	103	1,900	.....	.....	.....	.....	.....	.....	.....	.....	254	4,700	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1886	595	11,000	.....	.....	.....	.....	.....	.....	.....	.....	81	1,500	.....	.....	.....	.....	.....	.....	.....	.....	81	1,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1887	270	5,000	.....	.....	.....	.....	22	400	.....	.....	113	2,100	.....	.....	.....	.....	.....	.....	.....	.....	189	3,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1888	216	4,000	.....	.....	.....	.....	5	100	.....	.....	195	3,600	.....	.....	.....	.....	.....	.....	.....	.....	132	2,450	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1889	324	6,000	.....	.....	.....	.....	11	200	.....	.....	227	4,200	.....	.....	.....	.....	.....	.....	.....	.....	92	1,700	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1890	297	5,500	.....	.....	.....	.....	27	500	.....	.....	216	4,000	.....	.....	.....	.....	.....	.....	.....	.....	108	2,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1891	324	6,000	.....	.....	.....	.....	27	500	.....	.....	135	2,500	.....	.....	.....	.....	.....	.....	.....	.....	40	750	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1892	513	9,500	.....	.....	.....	.....	87	1,600	.....	.....	324	6,000	.....	.....	.....	.....	.....	.....	.....	.....	81	1,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1893	378	7,000	.....	.....	.....	.....	216	4,000	.....	.....	81	1,500	.....	.....	.....	.....	.....	.....	.....	.....	81	1,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1894	432	8,000	.....	.....	.....	.....	92	1,700	.....	.....	119	2,200	.....	.....	.....	.....	.....	.....	.....	.....	178	3,300	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1895	350	6,500	.....	.....	.....	.....	54	1,000	.....	.....	190	3,500	.....	.....	.....	.....	.....	.....	.....	.....	135	2,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1896	486	9,000	.....	.....	.....	.....	108	2,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1897	216	4,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1898	324	6,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1899	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1900	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1901	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1902	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1903	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1904	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1905	498	8,970	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1906	2,380	44,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1907	2,490	46,000	.....	.....	160	3,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1908	3,010	55,750	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1909	1,190	22,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1910	650	12,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1911	810	15,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	135	2,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1912	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1913	270	5,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1914	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1915	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1916	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1917	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1918	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	270	5,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1919	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	27	500	.....	.....	216	4,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1920	54	1,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	65	1,200	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1921	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	27	500	.....	.....	27	500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1922	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	54	1,000	.....	.....	58	1,080	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1923	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	70	1,292	.....	.....	54	1,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1924	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	40	748	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1925	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	35	657	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1926	.....	.....	.....	.....	43	805	.....	.....	.....	.....	.....	.....	96	1,775	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	56	1,400
1927	.....	.....	.....	.....	30	564	.....	.....	.....	.....	.....	.....	57	1,050	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	30	750
1928	10	185	.....	.....	9	174	.....	.....	.....	.....	.....	.....	22	403	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	65	1,625
1929	16	290	1	19	75	1,410	.....	.....	.....	.....	.....	.....	15	279	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75	1,875
1930	14	255	2	38	14	254	.....	.....	.....	.....	.....	.....	4	73	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20	500
1931	.....	.....	3	59	23	429	.....	.....	.....	.....	.....	.....	42	748	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7	175
1932	.....	.....	.....	.....	38	718	.....	.....	.....	.....	.....	.....	96	1,868	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1933	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	54	1,375	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1934	8	244	.....	.....	8	237	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1935	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1936	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1937	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	91	2,740	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1938	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	79	2,550	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1939	.....	.....	.....	.....	4	110	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	87	2,800	.....	.....	.....	.....	103	3,420	.....	.....	12	382	.....	.....	.....	.....
1940	17	585	.....	.....	7	203	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20	684	.....	.....	.....	.....	78	2,625	42	1,360	.....	.....	8	256	7	175
1941	1,339	45,964	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	45	1,550	.....	.....	.....	.....	45	1,505	49	1,670	.....	.....	38	1,164	7	175
1942	910	30,938	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	37	1,222	54	1,840	.....	.....	255	8,618	.....	.....
1943	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	32	1,053	26	856	.....	.....	77	2,487	3	75
1944	3	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	25	832	.....	.....	.....	.....	.....	.....	.....	.....
1945	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals	93,752	1,769,397	6	116	411	7,904	649	12,000	805	14,910	1,784	33,000	1,315	26,943	1,410	26,104	1,265	25,658	189	3,500	2,101	38,900	320	10,657	171	5,726	12	382	378	12,525	270	5,400

Grand totals: 104,931 oz., $1,992,845.

Table V.—Recorded Placer-gold Production of Slough Creek Section, 1874–1945.

Year.	Slough Creek.				Nelson Creek.		Coulter Creek.		Slough Creek and Devils Lake Creek.		Devils Lake Creek.		Burns Creek.	
	Benches between Nelson and Devils Lake Creeks.		Benches between Devils Lake and Burns Creeks.											
	Ounces.	Value.	Ounces.	Value.	Ounces.	Value.	Ounces.	Value.	Ounces.	Value.	Ounces.	Value.	Ounces.	Value.
		$		$		$		$		$		$		$
1874	.....	.....	.....	.....	435	8,250	.....	.....	.....	.....	.....	.....	1,250	23,800
1875	.....	.....	.....	.....	515	9,750	.....	.....	.....	.....	.....	.....	580	10,990
1876	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1877	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1878	.....	.....	.....	.....	2,080	39,550	16	300	.....	.....	.....	.....	965	18,300
1879	.....	.....	.....	.....	1,090	20,700	43	800	.....	.....	.....	.....	420	7,940
1880	.....	.....	.....	.....	1,090	20,745	11	200	21	400	.....	.....	195	3,700
1881	.....	.....	.....	.....	1,220	23,167	.....	.....	1,315	25,000	.....	.....	258	4,891
1882	.....	.....	.....	.....	1,210	23,000	.....	.....	1,000	19,000	.....	.....	184	3,500
1883	.....	.....	.....	.....	480	9,000	.....	.....	790	15,000	.....	.....	369	7,000
1884	.....	.....	.....	.....	368	7,000	.....	.....	1,210	23,000	.....	.....	52	1,000
1885	.....	.....	.....	.....	158	3,000	.....	.....	1,525	29,000	.....	.....	158	3,000
1886	.....	.....	.....	.....	131	2,500	.....	.....	790	15,000	.....	.....	79	1,500
1887	.....	.....	.....	.....	184	3,500	.....	.....	395	7,500	.....	.....	42	800
1888	.....	.....	.....	.....	158	3,000	.....	.....	553	10,500	.....	.....	242	4,600
1889	.....	.....	.....	.....	195	3,700	.....	.....	590	11,200	.....	.....	158	3,000
1890	.....	.....	.....	.....	262	5,000	.....	.....	460	8,700	.....	.....	158	3,000
1891	.....	.....	.....	.....	268	5,100	.....	.....	525	10,000	.....	.....	210	4,000
1892	.....	.....	.....	.....	242	4,600	.....	.....	450	8,500	.....	.....	158	3,000
1893	.....	.....	.....	.....	525	10,000	.....	.....	450	8,500	.....	.....	420	8,000
1894	.....	.....	.....	.....	264	5,000	.....	.....	340	6,500	.....	.....	290	5,500
1895	.....	.....	.....	.....	368	7,000	.....	.....	535	10,200	.....	.....	342	6,500
1896	.....	.....	.....	.....	155	2,950	.....	.....	368	7,000	.....	.....	88	1,700
1897	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1898	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1899	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1900	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1901	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1902	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1903	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1904	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1905	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1906	1,760	33,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1907	2,130	40,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1908	1,580	30,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1909	1,580	30,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1910	1,050	20,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1911	1,050	20,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1912	1,580	30,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1913	1,050	20,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1914	1,050	20,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1915	1,050	20,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1916	1,050	20,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1917	1,050	20,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1918	368	7,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1919	237	4,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1920	237	4,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1921	316	6,000	.....	.....	.....	.....	.....	.....	.....	.....	105	2,000	.....	.....
1922	147	2,800	.....	.....	.....	.....	.....	.....	.....	.....	79	1,500	.....	.....
1923	184	3,500	.....	.....	.....	.....	.....	.....	.....	.....	130	2,500	.....	.....
1924	246	4,680	.....	.....	.....	.....	27	500	.....	.....	10	189	.....	.....
1925	660	12,540	172	3,250	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1926	305	5,800	165	3,080	.....	.....	4	72	.....	.....	.....	.....	.....	.....
1927	394	7,500	178	3,360	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1928	405	7,698	116	2,188	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1929	414	7,866	58	1,095	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1930	496	9,380	65	1,230	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1931	255	4,802	124	2,260	.....	.....	18	329	.....	.....	.....	.....	.....	.....
1932	320	6,720	100	2,160	.....	.....	20	370	.....	.....	.....	.....	.....	.....
1933	351	9,120	90	2,367	.....	.....	56	1,200	.....	.....	.....	.....	.....	.....
1934	187	5,684	123	3,880	.....	.....	125	4,820	.....	.....	.....	.....	.....	.....
1935	347	10,835	71	2,280	.....	.....	46	1,392	.....	.....	.....	.....	.....	.....
1936	967	30,000	.....	.....	.....	.....	136	4,174	.....	.....	.....	.....	.....	.....
1937	313	9,432	576	18,512	.....	.....	64	1,933	.....	.....	.....	.....	.....	.....
1938	.....	.....	563	17,774	.....	.....	34	1,004	.....	.....	.....	.....	.....	.....
1939	912	27,140	976	29,608	.....	.....	76	2,450	.....	.....	.....	.....	.....	.....
1940	573	19,187	582	20,040	.....	.....	14	485	.....	.....	.....	.....	.....	.....
1941	242	8,190	725	25,310	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1942	206	7,000	438	14,960	4	142	10	345	.....	.....	.....	.....	.....	.....
1943	.....	.....	.....	.....	.....	.....	43	1,480	.....	.....	4	138	.....	.....
1944	.....	.....	.....	.....	10	354	115	3,970	.....	.....	28	966	.....	.....
1945	24	792	235	8,032	5	172	75	2,580	.....	.....	10	346	6	199
Totals	25,086	526,666	5,357	161,385	11,417	217,180	933	28,404	11,317	215,000	366	7,630	6,624	125,911

Grand totals: 61,100 oz., $1,282,176.

Most of the gold production of the Slough Creek section has come from the bedrock benches lying along the south side of Slough Creek between Nelson and Burns Creeks, and from Nelson and Burns Creeks themselves. Undoubtedly the richest ground worked was in the channels of the two creeks, where several reconcentrations of gold-bearing gravel may have been effected. The gold was coarse, nuggets up to 16 and 17 oz. having been recovered in late years from the Ketch and the Point Company hydraulic workings.

Fineness of Placer Gold.

The fineness of the placer gold from various creeks in the Stanley area is shown in Table VI. The tabulated figures were obtained from official receipts of gold shipped to the Mint, except for four quoted from "Gold," a small pamphlet published in 1871 and written by F. G. Claudet, who was superintendent of the Government Assay Office in New Westminster.

Table VI.—Fineness of Placer Golds.

Location.	Source of Data.	Number of Parcels.	Weight of Gold.	Range in Bullion Fineness.		Average Bullion Fineness.		True Fineness based on Au + Ag = 1,000.	
				Gold.	Silver.	Gold.	Silver.	Gold.	Silver.
			Oz.						
Lightning Creek	Stanley Mines, Ltd.	12	862	887½–893	84–92	891	89	909	91
	B & K placer at mouth of Amador Creek	1	12	.....	.....	847½	87	907	93
	Butcher Bench	5	129	881 –890	86–97	885	93	905	95
	Dunbar Flat	6	342	836½–864½	93–107	855	102	894	106
	"Gold" *	....	.....	887 –898	.....	888	.....	.....	.....
Donovan Creek	M. Sundberg hydraulic	6	724	905½–912	85–89½	908	87	912½	87½
	Rottacker placer	†	.....	.....	.....	915	85	915	85
Anderson Creek	Emil Falck	3	6	908½–913½	.....	910½	.....	.....	.....
Jawbone Creek	H. M. Bryant	3	15	904½–907½	.....	906	.....	.....	.....
Last Chance Creek	W. M. Hong	3	61	895 –900	.....	897	.....	.....	.....
	"Gold"	....	.....	.....	.....	905	.....	.....	.....
Perkins Creek	Eatman hydraulic	3	45	889½–892	89–92	890	90	908	92
Grub Gulch	Ennerdale placer	9	293	881½–890½	84–92	886	88	910	90
Van Winkle Creek	"Gold"	....	.....	899 –923	.....	908	.....	.....	.....
Houseman Creek	Eagle Creek hydraulic	1	56	.....	.....	870½	112½	886	114
Slough Creek	The Point Company (benches)	15	903	904½–920½	62–78	915	67	932	68
	The Ketch (benches)	9	3,575	901½–912	66	907	66	932	68
Coulter Creek	Coulter Creek hydraulic	3	285	894 –905	77–79	905	78	921	79
Devils Lake Creek	L. Bedford hydraulic	1	54	.....	.....	914½	61	937	63
	E. Rask hydraulic	5	57	900 –906	72–78	903	75	923	77
Burns Creek	"Gold"	....	.....	895 –920	.....	906	.....	.....	.....

* From "Gold," by F. G. Claudet, Superintendent of Government Assay Office, New Westminster, published by Mainland Guardian, 1871.

† Specimen.

Note.—Fineness figures, except for those quoted from "Gold," have been obtained from official Mint receipts of gold shipped to the Mint by the various operators.

The bullion fineness of gold shipments from any one operation shows only a small range. For the most part the range is 10 parts per thousand or less, but reaches as much as 16 parts per thousand for gold from the Point Company operations on the Slough Creek benches. No information is available regarding the range in fineness of small individual pieces of gold making up the shipments.

In all instances the Mint figures of gold and silver fineness add up to about 970 to 990. The remaining 10 to 30 parts represent base metals, lead, copper, mercury, etc., that in part may have been original constituents of the natural gold or may have become combined during fusion at the Mint. Wherever possible, the true gold fineness has been calculated on the basis that the sum of the gold and silver finenesses equals 1,000 parts. These figures are referred to as the true fineness, the others are termed the bullion fineness.

With the exception of the gold from Houseman Creek, the range in true fineness of gold from Lightning Creek and its tributary creeks is remarkably small. Gold of highest fineness, 915 parts per thousand, is from Donovan Creek, and at successive points up-stream the gold is progressively but slightly less fine until Butcher Bench is reached, where the true fineness is 905. At Dunbar Flat and Houseman Creek the fineness is considerably less. The decrease in fineness up-stream is more apparent in the bullion fineness figures and was evidently known by the early miners and gold-buyers. The prices paid by the banks at Barkerville before they closed in 1879 for Lightning Creek gold was $17.55 per ounce for gold mined down-stream from Spruce Canyon and only $17 per ounce for gold mined up-stream from Spruce Canyon.* These are the net prices paid in Barkerville after deducting bank commission, express, insurance, assay, and Mint charges.

The reason for this variation is not known. However, it is believed to reflect a regional variation in the gold fineness, and is not interpreted as suggesting that the gold has migrated down-stream from the head of the creek and with differential solution of its silver content has been correspondingly enriched in gold.

The range in fineness of Slough Creek placer gold is small. There is an exact correspondence of the true fineness of the placer gold from the two parts of the Slough Creek benches; i.e., that from the Ketch and that from the Point Company and other Chinese workings between Nelson and Devils Lake Creeks. Gold of lowest fineness, 921, is from Coulter Creek; that of highest fineness, 937, from Leo Bedford's hydraulic on Devils Lake Creek, and 936 from a single 71-oz. shipment from the Slough Creek benches west of Devils Lake Creek. There does not appear to be any definite pattern of variation of the fineness in the Slough Creek section. It should be noted that gold of 923 average true fineness was recovered by E. Rask at the very summit of Devils Lake and Chisholm Creeks, whereas placer gold south of the divide is of lower fineness. This placer gold is close in fineness to that of surface lode gold (927) from the Acme group (*see* Table II), some 7,500 feet to the south-west.

The true fineness of placer gold from Slough Creek and its tributaries is considerably higher than that of gold from the Lightning Creek section. The average of Lightning Creek gold might be considered as 910 fine or slightly less, whereas the average fineness of Slough Creek gold is 930 or slightly more. This appears to be a fundamental regional difference between the placer golds from the two sides of the divide. Its full interpretation is not possible because of the lack of information regarding lode-gold fineness in the Slough Creek section and because of the lack of specific information concerning the problem of variations of gold fineness in general.

The fineness of Lightning Creek gold is comparable to the highest gold fineness obtained from samples from Burns Mountain veins. That the fineness of the placer gold is higher than that of the low fineness gold of sample 5 in Table II is not inconsistent with the fact that under certain circumstances primary lode gold may be enriched and produce placer gold of considerably higher quality (Mertie, 1936, pp. 234–236).

Relation of Placer Deposits to Bedrock Geology.

The most significant feature of the Stanley area is that a very high percentage of the placer gold produced has come from the stretches of Lightning Creek and of the Slough Creek benches bounded on the west by the Last Chance-Nelson Creek fault and on the east by the Burns Creek-Butcher Bench fault. Moreover, the productive tributary creeks, with few minor exceptions, lie entirely within or very close to the area limited to east and west by these two faults. Van Winkle, Last Chance, Burns, and Nelson Creeks were the richest tributaries, and all lie along or exceedingly close to these two faults. In contrast, Grub Gulch, Perkins, Devils Lake, and Coulter

* *Minister of Mines, B.C.*, Ann. Rept., 1902, p. 104.

Creeks, though gold-bearing, were not so rich as the above four and lie along or close to the Grub Gulch-Coulter Creek fault. Davis Creek and Oregon Gulch are close to and on opposite sides of the Last Chance-Nelson Creek fault. Anderson Creek was not notably productive and lies a considerable distance west of the Last Chance-Nelson Creek fault. Houseman Creek and the upper part of Lightning Creek, though gold-bearing, were not highly productive and lie to the east of the Butcher Bench-Burns Creek fault. The conclusion that the Last Chance-Nelson Creek and the Butcher Bench-Burns Creek faults have played a fundamental part in localizing the placer-gold occurrences seems inescapable.

In addition, the extraordinarily rich placer stretch on Lightning Creek and the rich placer stretches on Van Winkle and Last Chance creeks coincide with the small area of intricately folded rocks along the anticlinal axis running along Lightning Creek. In contrast, however, no unusually complex folding is known along Slough Creek nor at Burns and Nelson Creeks where rich placer ground was mined. No coincidence nor areal relationship between placer creeks and the outcrops of specific formations, such as are present in the Barkerville Gold Belt, has been recognized in the Stanley area.

Relation of Placer Deposits to Gold-bearing Veins.

The main gold-bearing veins known in the Stanley area are the Perkins veins on Burns Mountain, the Foster Ledges on Oregon Gulch, and the veins on the Acme group north of Stanley. The distribution of the Lightning Creek placer deposits definitely indicates that they were not derived solely from veins at these three localities. For if they were, a phenomenally rich trail of placer gold should have extended from the mouth of Perkins Creek up to its head. Actually the gold content was progressively lower up Perkins Creek toward the Perkins veins. Moreover, not only was a large amount of gold mined on Lightning Creek up-stream from the mouth of Perkins Creek, but the two richest tributaries, Last Chance and Van Winkle Creeks, are on the opposite side of the valley from Burns Mountain. Similarly, there is no rich trail of gold extending up Chisholm Creek and up Oregon Gulch to the Foster Ledges near its head. Undoubtedly the Foster Ledges and the Burns Mountain veins contributed gold to Oregon Gulch and to Perkins Creek, but the bulk of Lightning Creek gold is not considered to have been derived from these known auriferous veins.

The placer gold that was concentrated on lower Van Winkle and Last Chance Creeks, in the rich stretch along Lightning Creek, and on Butcher Bench, where a 30⅛ oz. nugget was found, is considered to have been derived from the erosion of veins very close to the position of the worked-out deposits. The placer gold is not thought to have migrated very far down-stream, and the progressive decrease in amount and size of gold down-stream from the old Vancouver workings indicates the lower limit of the bedrock source. The fact that few veins outcrop along this stretch of Lightning Creek is in large part due to the extensive cover of drift that obscures most of the bedrock, except along the sides of the creek. There is, on the other hand, no positive assurance that gold-bearing veins still are present now along this section of the creek.

The coincidence of the richest placers with the folded rocks along the anticlinal axis running down Lightning Creek and with the section of Lightning Creek cut by three major faults suggests that the structural environment was favourable for the development of fractures which were mineralized with auriferous quartz. There does not appear to be any evidence inconsistent with this hypothesis, but conversely there is no direct evidence, now observable, of fracturing or of auriferous veins to support it.

In the Slough Creek section no auriferous veins are known, and the source of the placer gold is unknown. One can only point out the relationship of the placer gold to the major faults and infer that fractures were developed in favourable near-by rocks and that they were mineralized with gold-bearing quartz veins.

PROSPECTING POSSIBILITIES.

At the present time most of the ground in the Stanley area is held as Crown-granted or recorded mineral claims. Most exploratory work in recent years has been centred around the known veins, most of which were found a great many years ago.

Despite the fact that the lode discoveries were made many years ago, the Stanley area still provides lode-gold prospecting possibilities. The possibilities are in prospecting for veins or vein-zones whose eroded upper parts were the source of the rich placer deposits. There is, however, no assurance that gold-bearing veins will be found, nor that the erosion that released the placer gold did not completely destroy the gold-bearing veins or leave only a few root-zones. The bedrock is so largely blanketed by drift that no direct information bearing on this point is available.

Because of the drift-cover, prospecting is not easy and should be based on a sound geological hypothesis. It is probable that any vein that outcrops has been examined, prospected, and sampled already. Prospecting must therefore be directed toward finding veins that are not exposed.

The three major faults, shown on the accompanying map, present lines along which intensive prospecting across a narrow belt of but a few hundred feet width could be undertaken. The control exercised by these faults upon rock fractures which subsequently may have been mineralized is not definitely known, but their influence appears to have been fundamental. Until more information is available and until a more precise hypothesis can be developed, it is considered that they present favourable lines for detailed prospecting.

In particular, those stretches along the faults close to Lightning Creek and close to the complex folding along the anticlinal axis on Lightning Creek, where the chances of a favourable structural environment existing might be much greater, are believed to offer attractive possibilities for finding additional veins.

That some veins do exist along Lightning Creek is shown by their presence in Spruce Canyon, lower Van Winkle Creek, and the Montgomery ledge (Bowman, 1889, p. 39), and others uncovered in the old Vancouver placer-workings. One of these in the underground drift workings evidently was very rich, but whether it acted as a natural riffle or whether it provided the gold itself cannot be determined with certainty.

The stretches along the faults near and south of the Slough Creek benches offer prospecting possibilities which, based on the amount of gold recovered from the benches, may not be quite so attractive as near Lightning Creek. On the other hand, the near-by presence of a band or bands of black argillaceous quartzite, generally a favourable rock-type for veins, should increase attractiveness for prospecting where the Nelson Creek fault cuts the westerly extension of the black quartzite that is exposed along the canyon of Devils Lake Creek.

On the Slough Creek benches several veins are exposed in the Ketch hydraulic pit and a large drag fragment of slightly mineralized vein-quartz lying in the fault-zone is exposed in a hydraulic pit east of Nelson Creek.

The thick and widespread drift-cover will continue to make prospecting, particularly in the valley-bottoms, most difficult. At higher levels on the ridge-tops the drift is thinner, and effective use could be made of bulldozer stripping. Actually in 1946 a new gold-bearing vein was found by bulldozer stripping within a few hundred yards of Perkins' old cabin on Burns Mountain. In the valley-bottom, on the lower thickly covered hillsides, or on steep slopes, bulldozer stripping is not feasible. There, resort may have to be made to systematic " post-hole " prospecting and panning of drift and bedrock material. Every advantage must be taken of newly obtained information. The difficulties are great and have been sufficient to prevent any important new discoveries being made during the past sixty years. If, however, veins are present that are commensurate in value with the value of placer gold already produced, then correspondingly determined efforts should be made to find them.

CHAPTER V.—DESCRIPTIONS OF PROPERTIES.

LODE PROPERTIES.

Cariboo Rainbow Gold Mines, Ltd. (31, 32, and 33).*

The company, 1004 Sun Life Building, Vancouver, holds thirty-five claims and fractions lying on the south side of Burns Mountain. The main showings on the claims are the Perkins veins, the Galena vein, and the Cohen Incline veins, all of which lie between 5,100 and 5,250 feet elevation. A camp at 5,150 feet elevation is reached by 1¼ miles of wagon-road, which leaves the Lightning Creek road 1½ miles south-east of Stanley. The first quartz-vein discoveries were made on Burns Mountain sometime in the early 1870's. By 1878 the ground was owned by J. C. Beedy, who in that year built a small quartz mill at Van Winkle. In 1879 quartz ore mined from the Beedy, later called the Perkins, veins was hauled to the mill and gold valued at $3,500 was recovered. On the death of J. C. Beedy in 1880, the property was acquired by J. Reid, of Quesnel. Reid's company drove a crosscut in from the west side to cut the veins at a depth of about 75 feet below their outcrop. One vein intersected at 340 feet from the portal was drifted to the north for 20 feet. By 1885, when the ground was examined by Amos Bowman, the property was being worked by E. Perkins. In 1891 it is recorded† that "Mr. Perkins on Burns Mountain, continues to work his man-power arrastre and manages to make his living from it while prospecting the mine." Perkins continued to mine the veins at shallow depth for many years. Picked quartz was roasted and crushed, and the gold was recovered either in an arrastre or with a rocker. The old arrastre may still be seen, and from it tailings have run downhill to the west for about 150 feet. In 1902 two of Perkins' claims were bonded by C. J. Seymour Baker and A. J. R. Atkin. Ten tons of ore, treated by them in the old Government reduction works near Barkerville, yielded about 10 oz. of gold.

After Perkins' death in 1919 the property was acquired by C. Fuller and D. Hawes, who held the ground until it was acquired from them by the Burns Mountain Gold Quartz Mining Company, Limited, in 1932. The company drove a crosscut 2,163 feet in length to crosscut the Perkins veins at a depth of about 275 feet below the outcrop and also drove the Reid adit ahead about 50 feet. On lapse of the company's claims the ground was relocated by R. E. MacDougall, W. E. North, and J. J. Gunn, of Wells. The claims were acquired in 1946 by the present company.

The veins at the Cohen Incline already had been worked at the time of Bowman's examination in 1885, but no other information regarding the work done is available. Bowman makes no mention of the Galena vein workings to the east of the camp, and no information regarding the age or the results of the work is available.

The rocks underlying the claims include silvery-grey sericitic quartzite, fissile grey quartzite, and brown thinly-laminated argillaceous schist and quartzite. Thin beds of dark rice-grain quartzite are interbedded with the other quartzite, and at the Cohen Incline there is a bed of fine pea-pebble conglomerate. In and around the surface and underground workings on the Perkins veins the rocks are dominantly grey and brown thinly-laminated argillaceous schist and fine-grained quartzite. These rocks are similar to beds exposed along Lightning Creek up-stream from the mouth of Amador Creek, and also to the rocks along Oregon Gulch.

The rocks for the most part have a fairly constant strike of from north 20 to 25 degrees west and dip at angles of 15 to 40 degrees eastward. At the Cohen Incline and northward, the general trend swings to north or slightly east of north, with the dips remaining low and to the east. The rocks appear to be part of a fairly uniform panel of northerly striking and easterly dipping beds uncomplicated except by minor

* These numbers correspond to the numbered locations on the accompanying map.

† *Minister of Mines, B.C.*, Ann. Rept., 1891, p. 561.

drag-folds. These drag-folds are indicated by erratic strikes near the summit of Burns Mountain and, presumably, if the exposures were better, similar small drag-folds would be seen in and around the workings on the Perkins veins.

The projection of the Butcher Bench-Burns Creek fault lies about 800 feet west of the portal of the Reid adit. However, no evidence of the fault in that position has been found. It is possible that a fault in the Reid adit 70 feet from the portal or a wide shear-zone said to be about 120 feet west of the bend in the Burns Mountain long crosscut may mark the position of the fault on the ground. No other faults of any size were seen.

Joints belonging to the regional system of north-north-easterly striking and westerly dipping fractures are present in some exposures. Most of the fractures are unmineralized.

The known veins on the property may be grouped into two sets. The Perkins veins, several veins exposed in the Reid adit, one or more veins immediately north of the Cohen Incline, and several others exposed in bulldozed trenches, occupy fractures striking north 15 to 25 degrees east and dipping about 70 degrees to the west. The individual fractures do not appear to persist for more than several hundred feet and are considered to belong to the regional system of north-north-easterly trending joints. Several other veins, including the Galena vein, a small vein exposed in an open-cut just north of the old arrastre tailings, the vein on which the Cohen Incline was driven, and three other veins exposed in bulldozed trenches south and south-east of the Cohen Incline, occupy fractures striking north 50 to 60 degrees east. The dip is not every place apparent, and it is not known whether all dips are the same. In the Cohen Incline and in the open-cut north of the arrastre tailings the dip is about 75 degrees to the south-east or almost vertical, whereas the dip of the Galena vein appears to be 55 degrees to the north-west. There is no indication of the relationship of this fracture direction to the more northerly trending system. Some veins of both groups are auriferous.

The Perkins veins have had the most work done on them. The work (*see* Fig. 2, in pocket) comprises a large number of old open-cuts, stripping along the veins, a vertical shaft with workings to a depth of about 50 feet now filled with water, old stopes which came to the surface, now caved, and an inclined shaft caved at 15 feet depth. In the autumn of 1946 about 3,500 feet of bulldozer stripping was done, distributed between the Perkins veins, the Galena vein, and those around the Cohen Incline.

The work appears to indicate that at the surface there are three Perkins veins essentially parallel and about 50 feet apart. The central one, about 300 feet long, had the most work done on it and appears to have supplied most of the ore that was mined in the earliest days. At the south end about 130 feet of vein ranging from 4 to 12 inches of hard sugary quartz is exposed in surface trenches. An inclined shaft was sunk on it, but evidently none of the vein was mined. Little or no pyrite mineralization is seen in the quartz.

The northern 150 feet of this vein is indicated on the surface by old caved stopes. A vertical shaft was sunk to a reported depth of about 50 feet, and from it the vein was mined for a length of about 130 feet and to an unknown depth. No vein can be seen in-place, but ore from the dump shows pyrite, free gold, and galena. Selected samples from the dump indicate that the pyrite is auriferous.

About 50 feet to the west a second vein is exposed in a rock-cut about 40 feet long, and on it a cribbed shaft was sunk to an unknown depth. Whether this vein is explored underground from the vertical shaft or whether ore was mined from it is not known.

Immediately north of this vein is a caved area, presumably around the raise driven upward from the short crosscut about 325 feet from the portal of the Reid adit.

About 50 feet on the east side of the main Perkins vein is a third narrow, somewhat discontinuous vein up to about 6 inches wide following a sheared zone that is

exposed in shallow trenches for possibly 230 feet. The vein does not show any pyrite mineralization and presumably was not explored from the shaft.

These three are the Perkins veins. They strike north to north 15 degrees east and dip steeply, apparently about 70 degrees, westward and cut grey, brown, and black laminated quartzite and argillaceous schist, striking about north 10 degrees west and dipping 25 to 40 degrees east.

About 175 feet to the west of the Perkins veins and just north of the old arrastre tailings a 12- to 16-inch unmineralized quartz vein, exposed in a small open-cut, strikes about north 60 degrees east and apparently dips vertically.

In 1880 or 1881 the Reid adit was started at elevation 5,062 feet on the Perkins Creek side of the ridge and driven south 72 degrees east to crosscut the Perkins veins at a depth of about 75 feet beneath their outcrop. The adit cuts across thinly interbedded argillaceous schist and grey quartzite striking about north 35 degrees west and dipping 25 to 40 degrees to the north-east. At 73 feet from the portal the adit crosses a fault-zone composed of gouge and several feet of broken rock. Apart from several formational quartz stringers, the adit crosses three 2- to 6-inch quartz veins striking about north and dipping 75 degrees west, from one of which an assay of gold 0.03 oz. per ton was obtained. At 337 feet from the portal the adit crosses a 10- to 14-inch quartz vein striking north 25 degrees east and dipping 62 degrees to the north-west. The vein is poorly mineralized with pyrite, of which a selected sample of clean pyrite assayed 0.41 oz. gold per ton. The vein was drifted for 20 feet to the north, and in the face shows 10 inches of almost barren quartz. The crosscut continues for 100 feet beyond the vein, partly old work and partly work done by Burns Mountain Gold Quartz Mining Company, Limited, in 1933. No other veins were crossed.

The section on Fig. 2 shows that all the three Perkins veins on the surface do not persist to the Reid adit level and indicates that the one wide vein in the Reid adit may be the central Perkins vein on the surface.

A selected sample (99F) of pyrite from the dump of the Reid adit, which assayed gold, 1.06 oz. per ton, and silver, *nil*, indicates that the pyrite may carry substantial gold values.

Assays of samples from the old arrastre tailings are listed in Table VII, Nos. 66F to 69F, and of samples of rocker tailings near Perkins' cabin in Table VII, Nos. 63F to 65F.

The main underground work, started in 1933, by the Burns Mountain Gold Quartz Mining Company, Limited, was the driving of a long crosscut to intersect the downward projection of the Perkins vein-zone at a depth of about 275 feet below the outcrop.

The portal of the long crosscut is at an elevation of 4,844 feet on the south slope of Burns Mountain. The crosscut was driven north 33 degrees west for 1,743 feet then north 76 degrees west for an additional 420 feet. The air in the crosscut is deficient in oxygen inward from a point about 700 feet from the portal, consequently the workings were not examined beyond that point. The crosscut is located on Fig. 2 from surveys made in June, 1937, by M. H. Ramsay, B.C.L.S. It is reported that a 40-foot shear-zone was crossed at a point 110 feet east of the bend in the crosscut and that a vein striking north 17 degrees east and dipping 72 degrees westward was crossed 259 feet east of the bend. This vein was drifted for 127 feet to the north. At a point 347 feet past the bend a 2-foot quartz vein was crossed. The rocks near the portal of the crosscut are silvery-grey argillaceous schists and grey quartzite striking about north 20 degrees west and dipping about 15 degrees east.

The section on Fig. 2 suggests that the vein drifted on in the Burns Mountain long crosscut is more apt to be a separate parallel vein rather than the main Perkins vein that has persisted down to that depth. The two crosscuts run directly beneath the richest part of the surface showings and crosscut a considerable width at two successive levels below the surface. If, however, the rich section of vein on the surface

had a rake either to north or south, the two crosscuts may not have explored the vein-zone sufficiently thoroughly.

Assays of selected pyrite samples from the dump (*see* Table VII) indicate that the vein pyrite may carry a high gold content. Despite this, one of the less favourable aspects is that the observed pyrite content of the veins is generally very low.

Table VII.—Tabulated Assays of Samples from Cariboo Rainbow Gold Mines, Limited.

(Sample locations are shown on Figs. 2 and 3.)

Sample No. and Location.	Description.	Gold.	Silver.	Lead.
		Oz. per Ton.	Oz. per Ton.	Per Cent.
61F. Burns Mountain long crosscut dump	Vein quartz with 50% pyrite	0.66	*Nil*	.....
62F. Burns Mountain long crosscut dump	Selected clean pyrite	4.00	*Nil*	.....
63F. Burns Mountain rocker tailings near Perkins' cabin	Coarsely crushed roasted quartz	*Nil*	*Nil*	.....
64F. Burns Mountain rocker tailings near Perkins' cabin	¼-inch crushed roasted quartz	0.12	*Nil*	.....
65F. Burns Mountain rocker tailings near Perkins' cabin	¼-inch crushed roasted quartz	4.26	1.1	.....
66F. Burns Mountain arrastre tailings	Fine quartz sand	0.14	0.1	.....
67F. Burns Mountain arrastre tailings	Fine quartz sand	0.02	*Nil*	.....
68F. Burns Mountain arrastre tailings	Fine quartz sand	0.06	*Nil*	.....
69F. Burns Mountain arrastre tailings	Fine quartz sand	0.07	*Nil*	.....
94F. Reid adit 245 feet from portal	3-inch quartz vein	0.03	*Nil*	.....
95F. Reid adit—drift on vein 10 feet from crosscut	12-inch quartz vein across best pyrite mineralization	0.41	*Nil*	.....
96F. Reid adit—face of drift	12-inch crushed quartz—no pyrite	*Nil*	*Nil*	.....
99F. Reid adit dump	Selected clean pyrite	1.06	*Nil*	.....
100F. Dump by vertical shaft on Perkins vein	Selected quartz with 50% pyrite	2.86	1.6	.....
101F. Perkins vein 65 feet north of vertical shaft	Selected vein quartz with galena mineralization	0.23	7.7	12.8
122F. Prospect pit—along claim line 860 feet east of north-east corner of Lot 10727C	Vein quartz from dump	Trace	Trace	.....
134F. Dump at Cohen Incline workings	Selected quartz with 10% pyrite	0.02	Trace	.....
135F. Dump at Cohen Incline workings	Selected quartz with some galena and no pyrite	0.02	0.2	.....
136F. Dump at Cohen Incline workings	Selected quartz with finely disseminated pyrite	*Nil*	*Nil*	.....
137F. Dump at Cohen Incline workings	Selected quartz with 10% galena and no pyrite	0.56	3.2	6.0
151F. Dump at Galena vein workings	Selected quartz with 15% pyrite	0.58	Trace	.....
152F. Dump at Galena vein workings	Selected quartz with 15% galena	Trace	4.9	9.9
153F. Dump at Galena vein workings	Selected quartz with 25% pyrite and 15% galena	0.54	14.0	10.9
156F. Dump at portal of Burns Mountain long crosscut	Selected quartz with 65% pyrite	1.04	Trace	.....
157F. Dump at portal of Burns Mountain long crosscut	Pyritized wall-rock 80% pyrite	0.2	0.1	.....
158F. Dump at portal of Burns Mountain long crosscut	Selected quartz with 65% pyrite	0.32	Trace	.....
159F. Dump at portal of Burns Mountain long crosscut	Clean pyrite in ½-inch cubes from pyritized quartzite	0.08	*Nil*	.....
160F. Dump at portal of Burns Mountain long crosscut	Selected quartz containing ankerite but no pyrite	*Nil*	*Nil*	.....

The Galena vein lies about 700 feet to the north-east of the Perkins veins and at an elevation of about 5,190 feet (*see* Fig. 2). No information is available on when, or by whom, the surface work on this vein was done. It is claimed that 20 tons of ore was shipped to the reduction-works near Barkerville, but no records of it are available.

The vein is exposed by surface trenches and drifting for a length of about 190 feet. Trenches on strike to the south-west and a bulldozed trench to the north-east failed to find extensions of the vein in those directions. The main working consists of an open-cut driven in a north-westerly direction for 80 feet, at which point the vein

was crossed. From there a drift on the vein was driven for about 80 feet to the north-east at a depth of less than 15 feet beneath the surface. The drift is now caved and the vein can be seen only at two points along this length.

The rocks in and around the workings are interbedded quartz mica schists, dark-grey argillaceous schist and quartzite striking about north 10 degrees west and dipping 30 degrees to the east. The vein strikes about north 50 degrees east and appears to dip about 55 degrees to the north-west. The quartz vein reaches a maximum width of 18 inches, is mineralized with ankerite, chiefly along the walls, and, judging from vein material from the dump, also contains pyrite and galena. The assays of three samples of selected well-mineralized quartz from the dump are listed in Table VII (Sample Nos. 151F, 152F, and 153F).

The Cohen Incline workings are about 200 feet north of the north-west corner of Lot 10729C, about 1,500 feet to the north-east of the Perkins veins, and between elevations of 5,250 and 5,300 feet (*see* Fig. 3). Most of the surface and underground work was done before Amos Bowman's examination in 1885. The underground workings are caved. In 1946 about 1,500 feet of bulldozer stripping was done around the old showings.

The work has disclosed the presence of and partly explored a group of quartz veins, some striking north-north-east and the others striking east-north-east.

The rocks in and around the workings comprise a variety of micaceous quartzites, part of a panel that has a fairly uniform strike of about north 10 degrees east and a dip of about 20 degrees east.

The Cohen Incline was driven as an open rock-cut north 60 degrees east for 75 feet, at which point it is about 20 feet below the surface. There a vertical shaft was sunk, said by C. Fuller to be 70 to 90 feet deep, but now caved and filled with water. Beyond the shaft a drift continues in the same direction as the incline for 20 feet or more. This drift, though open, was not examined. The working follows a fracture striking north 65 degrees east and dipping 75 degrees south-east. The fracture is occupied by vein-quartz, which in one place is 12 inches wide. Very little quartz is to be seen in-place.

Fifty feet north of the Cohen Incline shaft is an old caved shaft of unknown depth. Extending northward from the shaft is a trench about 50 feet long that is interpreted as running along a vein having a strike of about north 25 degrees east and dipping 65 degrees west. To the west of the shaft is a dump containing several tons of vein-quartz mineralized with pyrite and galena. Sample Nos. 134F, 135F, 136F, and 137F listed in Table VII were taken from selected material from this dump.

North of the above trench is another old caved, cribbed shaft from which a sloughed surface trench leads 70 feet northward. The trench, which has quartz fragments in the dump beside it, presumably follows a second quartz vein which at the northern end of the cut is 6 inches wide, strikes about north 10 degrees east, and dips steeply to the west. Open-cuts to the north indicate that the vein does not extend farther in that direction.

Four veins are exposed in bulldozed trenches south and west of the north-west corner of Lot 10729C. An 8-inch unmineralized quartz vein striking about north 60 degrees east is exposed about 150 feet in a direction north 65 degrees west from the corner post. A second 8-inch vein is 60 feet along a bearing south 30 degrees west from the corner post. Another vein 6 to 10 inches wide and exposed for a length of 70 feet lies 100 feet south-west of the corner post.

Two veins lie 280 feet along a bearing south 75 degrees west from the corner post. The veins were covered by 4 to 5 feet of overburden and were disclosed by bulldozer trenching. The veins appear to strike 25 to 35 degrees east of north. One is well mineralized with galena and some pyrite. A long string of fine gold colours was obtained by panning oxidized vein material from it. This was the first new discovery of a gold-bearing vein made on Burns Mountain for many years.

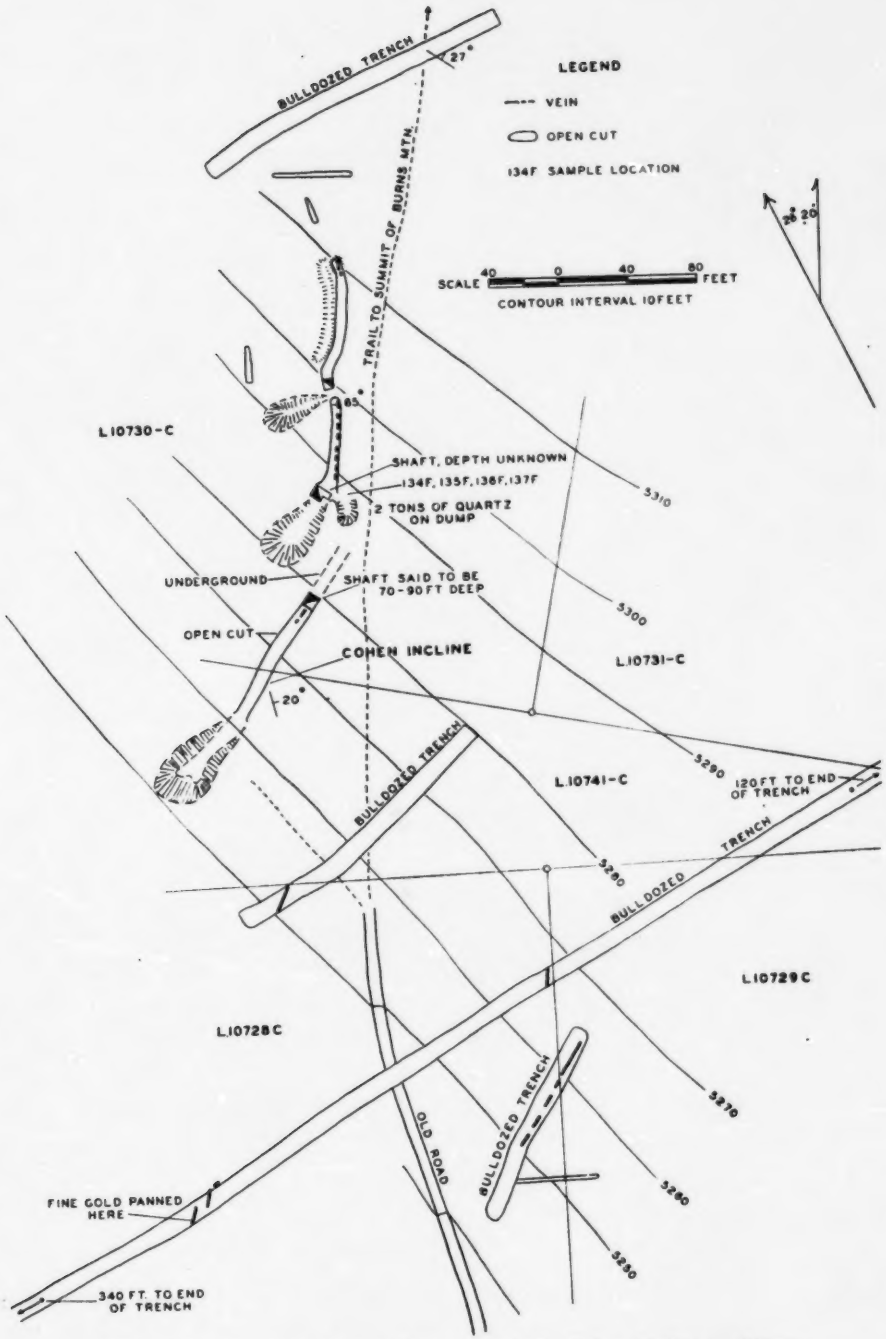

Fig. 3. Cariboo Rainbow Gold Mines, Limited—Cohen Incline workings.

It is evident that both the north-north-easterly and the east-north-easterly trending veins on Burns Mountain may be gold-bearing. Moreover, sections of some veins appear to have been high grade. Unquestionably, some gold has in the past been recovered from favourable sections of the veins where they were well mineralized. The key to the successful development of the present showings and to the planning of further exploratory work lies in determining the reasons for the localization of better mineralization; these at present are not evident.

[References: *Geol. Surv., Canada,* Ann. Rept., Vol. III, Pt. C, 1889, p. 38; *Geol. Surv., Canada,* Map 365, Lightning Creek, 1895; *Geol. Surv., Canada,* Mem. 149, 1926, p. 209; *Geol. Surv., Canada,* Mem. 181, 1935, p. 34; *Minister of Mines, B.C.,* Ann. Rept., 1914, p. 66; *Minister of Mines, B.C.,* Bull. No. 1, 1932, pp. 63, 64.]

Standard Location, Lucky Cap, and Side Location (30).

The Standard Location (Lot 62), the Lucky Cap (Lot 63), and the Side Location (Lot 64), Mineral Claims, Crown-granted in 1885, are owned by the estate of the late C. J. Seymour Baker, care of Carew Martin, K.C., Central Building, Victoria. The claims are on the summit of Burns Mountain at about 5,500 feet elevation and may be reached by about 1 mile of trail from the end of the road at the camp by the Perkins veins. The wide quartz veins outcropping in openly wooded ground near the summit of Burns Mountain evidently were found at much the same time as the Perkins veins. By 1883 the Burns Mountain Quartz Mining Company had acquired the claims and work had begun on driving a crosscut to intersect the downward extension of the veins at a depth of about 170 feet beneath the outcrop. The last mention of work by that company was in 1887. Since then there is no record of further underground work having been done.

The rocks on the claims are mainly light- to medium-grey quartzites, some of which are interbedded with thin layers of soft, dark argillaceous schist, all having a general strike of north to north 10 degrees east and with dips of 15 to 25 degrees east. A considerable amount of drag-folding of fairly small amplitude is indicated by attitudes differing from the regional trend of the formation.

Surface cuts (*see* Fig. 4) have partly explored at least three quartz veins striking from north 30 to 35 degrees east and dipping about 75 degrees to the north-west.

The middle vein, exposed in two open-cuts and a 58-foot shaft, has a total length of 140 feet. It ranges in width from 3½ to 5 feet for a length of 80 feet and narrows at its southern end. On it, at elevation approximately 5,535 feet, a shaft was sunk by the Burns Mountain Quartz Mining Company to a depth of 58 feet. The shaft is caved and filled with water. It is reported by Bowman (1889, p. 38) that "At their principal shaft the Burns Mountain Co. has sunk on a ledge 5 feet wide at the surface to a depth of about 50 feet. In the last half of that distance the ledge suffered a break, the quartz diminished to 2½ feet, pinched out, came in again in considerable force, but its further continuity has not been determined. Selvage lines and gangue with broken rock filled the place of the vein where broken." The vein-quartz, according to Bowman, was mineralized with pyrite, galena, and some visible gold. Only pyrite mineralization was seen in material from the shaft-dump and other pits; no visible gold was seen. One sample (149F), from the dump, of selected quartz containing about 15 per cent. pyrite assayed: Gold, trace; silver, *nil.* Another sample (150F), from the open-cut north of the shaft, of selected quartz containing about 10 per cent. pyrite assayed: Gold, trace; silver, trace.

About 50 feet to the west of the shaft-vein, open-cuts, quartz outcrops, and quartz float indicate the presence of a parallel vein having a maximum width of 3 feet. A vein exposed for 165 feet is separated along strike from a 50-foot length of vein by 120 feet where no quartz is exposed. Whether it is a single vein with an exposed length of 340 feet or two shorter separate veins is not known. The quartz is only sparingly mineralized with pyrite.

About 20 feet to the east of the shaft-vein a series of open-cuts traces another parallel vein whose maximum width is 4½ feet. A 160-foot length of vein up to 4½ feet wide is separated on the south by 110 feet from a 50-foot length of vein, maximum width 18 inches. Whether it is a single vein 320 feet long or two shorter separate ones is not known. This vein is in places only sparingly mineralized with pyrite.

In 1883 the Burns Mountain Quartz Mining Company, at an elevation of 5,366 feet on the north-east side of Burns Mountain, began driving a crosscut almost due south to explore, at a depth of about 170 feet, the downward extension of the veins exposed on the surface. It is evident from Bowman's map and from the apparent direction of the drive that the crosscut was headed for a point almost directly beneath the shaft.

In 1884 it is recorded* "that the Burns Mountain Quartz Mining Co. indeed pushed ahead their tunnel to a point where it was expected the ledge would be found, but, failing to strike which, the work was suddenly stopped for some time." They shortly after resumed operations.

In 1886 it is recorded† that "the Burns Mountain Quartz Mining Company have during a great part of the season had men under charge of Mr. Jacques, of Victoria, at work running drives in search of the main lode, but of the result of their labour I am not informed further than that they have now driven in over 800 feet. . . ."

In 1887‡ "the Burns Mountain Co. has done but little this season to further prove their mine."

Evidently the underground work did not encounter any veins comparable in width to those exposed on the surface, for no mention of further work on the property is recorded. Moreover, the dump at the portal of the crosscut contains little or no vein quartz. The crosscut is now caved and inaccessible.

[References: *Geol. Surv., Canada*, Ann. Rept., Vol. III, Pt. C, 1889, p. 38; *Geol. Surv., Canada*, Map 365 (Lightning Creek), 1895.]

Foster Ledge Gold Mines, Ltd. (9, 10, 11, and 12). Company office, 640 Pender Street West, Vancouver, B.C. The company owns thirty-four Crown-granted mineral claims (Lots 10427 to 10435, 1664 to 1680, 1688, 7723 and 7724, and 8895 to 8899) extending south-westward from the head of Chisholm Creek across Oregon Gulch to Davis Creek. A number of quartz veins were found on Oregon Gulch during the 1870's. The Foster Ledge, near the junction of the west branch of Oregon Gulch, yielded some high gold assays, and in 1877 a shaft was sunk on it. Shortly after, an adit was driven northward just above the junction of the west branch of Oregon Gulch. A little additional work was done before Foster Ledge Gold Mines, Limited, acquired the claims in 1933. Since then, two other adits have been driven and some work done in the old adit near the Foster Ledge.

The company built a camp on the lower part of Oregon Gulch about 1,000 feet from the highway and a little more than a mile north-east of Stanley.

The claims are underlain by grey micaceous quartzites of varying fissility, black argillaceous quartzite, some highly ankeritized quartzite schist, and grey quartzites that strike north to north 15 degrees west and dip 25 to 40 degrees east. The Last Chance-Nelson Creek fault runs in a northerly direction through the eastern half of Lot 1666, crosses the west branch of Oregon Gulch about 1,000 feet from the Foster Ledge, and runs through the western part of Lot 10431. Another fault, which may be fairly large, runs northward through the western part of Lot 8897 and was encountered in the underground workings there.

The showings (*see* Fig. 5) comprise the Foster Ledges explored by an old shaft, adit, and surface stripping on Oregon Gulch on the eastern side of Lot 10427, a vein formerly exposed in three open-cuts in the south-west corner of Lot 1664, a narrow vein exposed in an adit on the east side of Oregon Gulch in the eastern half of Lot 10435, and several narrow veins exposed in the adit in the western half of Lot 8897.

* *Minister of Mines, B.C.*, Ann. Rept., 1884, p. 418.
† *Minister of Mines, B.C.*, Ann. Rept., 1886, p. 198.
‡ *Minister of Mines, B.C.*, Ann. Rept., 1887, p. 257.

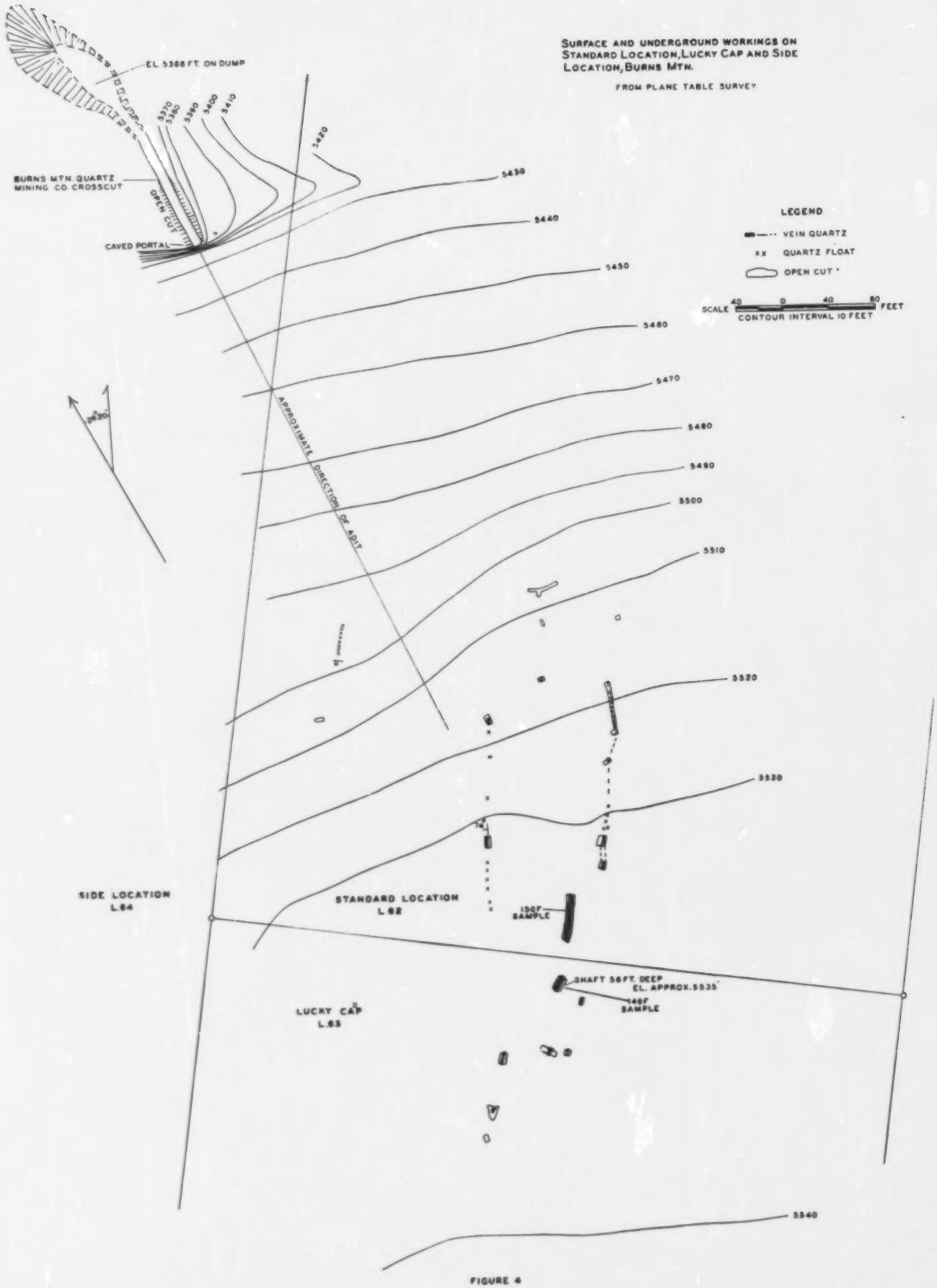
SURFACE AND UNDERGROUND WORKINGS ON STANDARD LOCATION, LUCKY CAP AND SIDE LOCATION, BURNS MTN.
FROM PLANE TABLE SURVEY
EL. 5368 FT. ON DUMP
5370
5380
5390
5400
5410
5420
5430
5440
5450
5460
5470
5480
5490
5500
5510
5520
5530
5540
BURNS MTN. QUARTZ MINING CO. CROSSCUT
OPEN CUT
CAVED PORTAL
APPROXIMATE DIRECTION OF ADIT
LEGEND
VEIN QUARTZ
QUARTZ FLOAT
OPEN CUT
SCALE 40 0 40 80 FEET
CONTOUR INTERVAL 10 FEET
SIDE LOCATION L.64
STANDARD LOCATION L.62
150F. SAMPLE
SHAFT 56 FT. DEEP EL. APPROX. 5535'
140F. SAMPLE
LUCKY CAP L.63

FIGURE 4

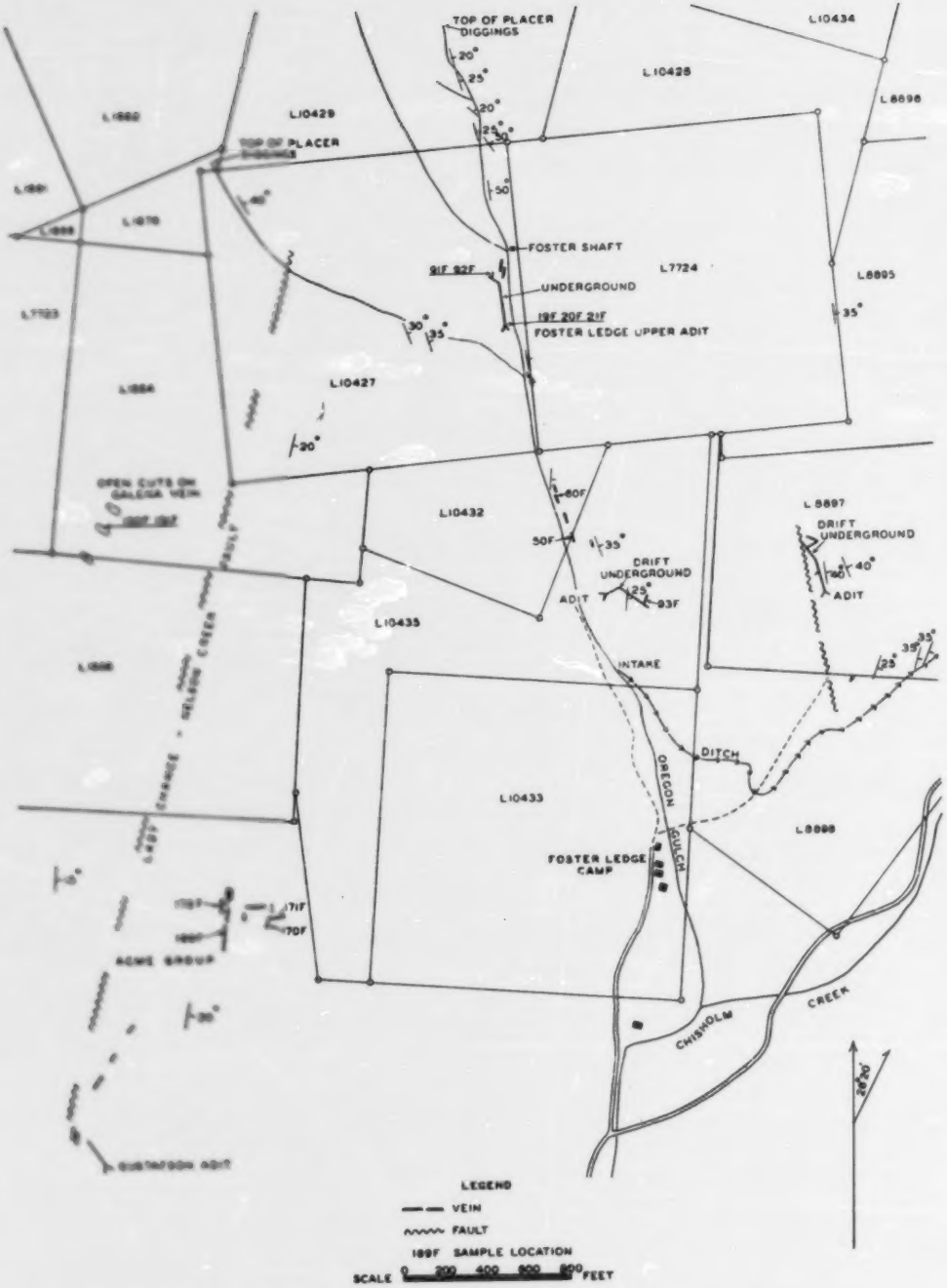

Fig. 8. Foster Ledge Gold Mines, Limited, and Acme group.

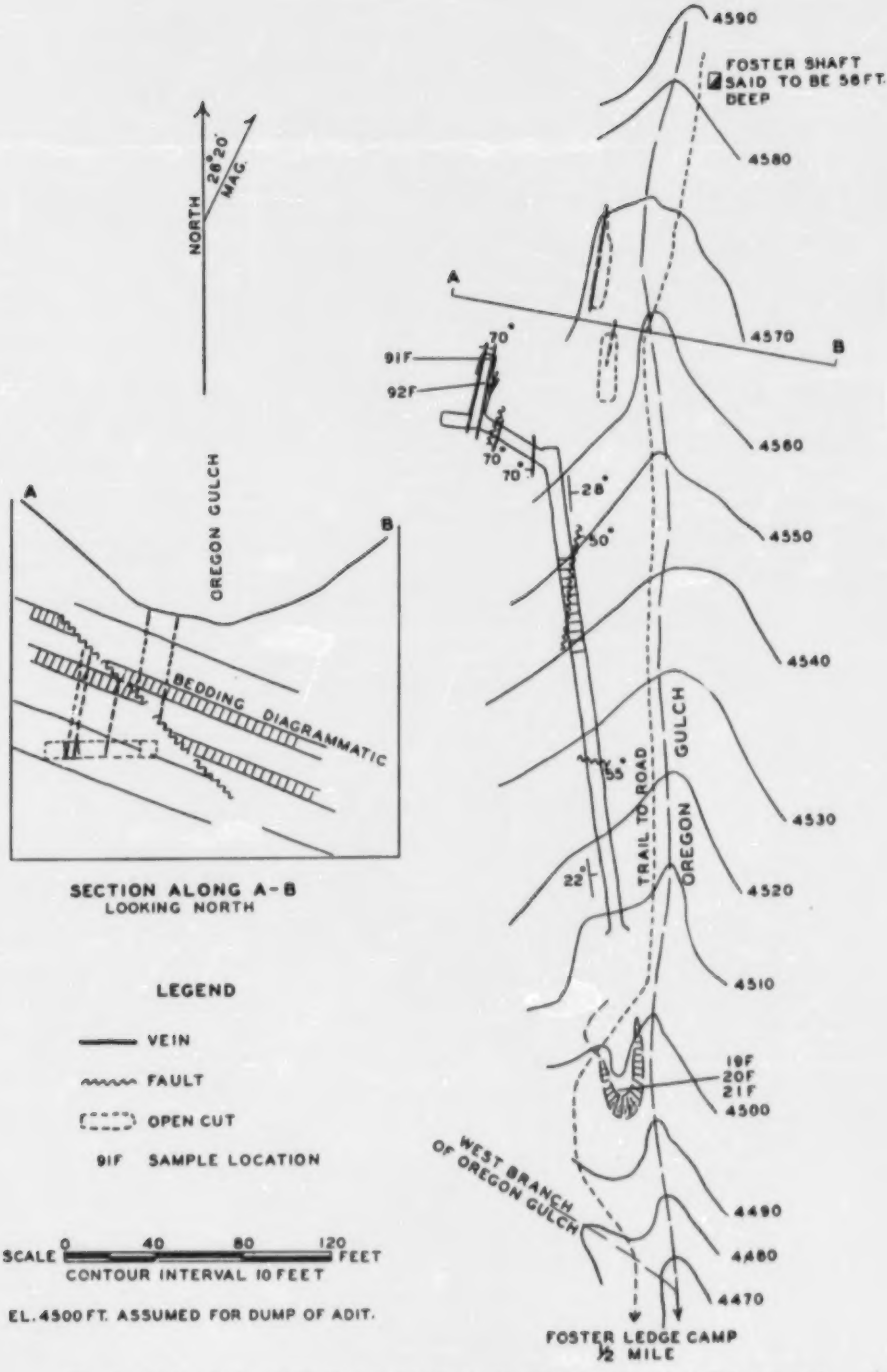

Fig. 6. Foster Ledge Gold Mines, Limited—showing surface and underground workings at upper adit.

The workings around the old Foster vein are shown in Fig. 6. The rocks exposed are for the most part interbedded dark-grey argillaceous quartzite and argillaceous schist, and light-grey quartzite in beds 1 to 6 inches in thickness. They strike about north and dip 22 to 28 degrees east.

On the west side of Oregon Gulch between elevations 5,560 and 5,570 feet two open-cuts expose two narrow parallel quartz veins 12 feet apart striking about north 10 degrees east and dipping 70 degrees westward. The westerly vein is exposed for a length of about 40 feet and the easterly for about 20 feet. Visible gold is said to have been found in the outcrop of these veins. About 260 feet south of these surface exposures and at elevation 4,500 feet, an adit was driven in a direction north 8 degrees west for 217 feet. From there a crosscut to the north-west crossed four narrow veins all striking about north 10 degrees east and dipping about 70 degrees west. The wider two of these veins, from 2 to 8 inches wide and mineralized with pyrite, galena, and sphalerite, were followed by a drift for 35 feet to the north. The veins evidently are the downward extension of the two veins exposed on the surface and are on the foot-wall side of a normal fault which crosses the adit from 135 to 165 feet from the portal and which (*see* section on Fig. 6) displaces the veins possibly 20 feet or more.

Two samples (91F and 92F) were taken from the vein in the adit, and three samples (19F, 20F, and 21F) of well-mineralized quartz were selected from the dump. The results are given in Table VIII. The gold content of all these is low. Evidently the high assays obtained in the early days were from surface samples that contained some free gold. No free gold was seen, though some is reported to be present in the vein.

Table VIII.—Tabulation of Assays of Samples from Foster Ledge Gold Mines, Limited.

(Sample locations are shown on Figs. 5 and 6.)

Sample No. and Location.	Description.	Gold.	Silver.
		Oz. per Ton.	Oz. per Ton.
19F. Foster Ledge adit dump	Selected high pyrite mineralization	0.06	0.4
*20F. Foster Ledge adit dump	Selected galena mineralization	0.02	1.0
†21F. Foster Ledge adit dump	Selected sphalerite mineralization	0.01	*Nil*
59F. Oregon Gulch	15-inch formational quartz vein—no sulphides	0.01	*Nil*
60F. Oregon Gulch	12-inch formational quartz vein—small amount galena mineralization	0.01	*Nil*
91F. Foster Ledge adit	7-inch quartz vein with pyrite, galena, and sphalerite	0.16	*Nil*
92F. Foster Ledge adit	Selected high sphalerite with some galena and pyrite	0.07	0.7
93F. Foster Ledge lower adit	Composite sample along 1- to 3-inch vein with no apparent mineralization	*Nil*	*Nil*
130F. Galena vein on Lot 1664	Selected solid galena	Trace	31.6
131F. Galena vein on Lot 1664	Selected leached and oxidized quartz	0.02	Trace

* Contains 4.9 per cent. lead.
† Contains 2.5 per cent. zinc.

The old Foster shaft, reported depth 56 feet, is on the east side of Oregon Gulch, 100 feet from the surface stripping on the veins. It is reported* "to have been sunk on two 5-foot veins 4 feet apart." This is probably erroneous because the shaft is only 5 by 7 feet and no vein-quartz is to be seen on the dump. Any veins, judging from the others on the claims, are more apt to have been about 5 inches wide. The shaft is now caved and filled with water, and no veins are to be seen.

Three open-cuts were put down through about 4 feet of overburden in the south-west corner of Lot 1664 on the ridge between Oregon Gulch and Davis Creek and about 600 feet west of the Last Chance-Nelson Creek fault. One cut is on the south boundary of Lot 1664 about 160 feet from the south-west corner; the other two lie to the north-east. The cuts are now sloughed and no vein can be seen. However, quartz fragments on the dump indicate that a vein was found and that, in the central cut, it was mineral-

* *Geol. Surv., Canada*, Sum. Rept., 1933, Pt. A, p. 42.

ized with galena. The trend of the open-cuts indicates that the strike of the vein is about north 30 degrees east. Two samples (130F and 131F) were taken from the dump of the central cut. Selected solid galena (130F) assayed: Gold, trace; silver, 31.6 oz. per ton. Leached and rusty quartz with no sulphides present (131F) assayed: Gold, 0.02 oz. per ton; silver, trace.

A number of formational quartz veins outcrop in Oregon Gulch down-stream from the Foster Ledge upper adit. Samples from two of them (59F and 60F) both assayed: Gold, 0.01 oz. per ton; silver, *nil*.

Foster Ledge Gold Mines, Limited, drove an adit on the east side of Oregon Gulch in the eastern part of Lot 10435 and about 1,300 feet north of the camp. The portal of the adit is about 25 feet above creek-level, at the base of a bluff in which a number of quartz veins are exposed. The adit is driven north 65 degrees east for 70 feet, then south 57 degrees east for 170 feet to the face. The rocks exposed in the adit are thinly laminated argillaceous quartzite with thin black argillaceous partings and 1- to 4-inch beds of light-grey hard quartzite. The rocks strike about north 35 degrees west and dip 20 to 30 degrees to the north-east. A 2- to 5-inch quartz vein striking north 25 degrees east and dipping 80 degrees north-east was crossed at a point 32 feet back from the face. This narrow vein was followed by a drift for 43 feet to the north-east. No sulphide mineralization was seen in the quartz and a composite sample (93F) along its length assayed: Gold, *nil;* silver, *nil*. From this vein Lay* obtained a sample of selected material which assayed: Gold, 0.24 oz. per ton. A fault, strike north and dip 30 degrees east, crossed by the adit 80 feet in from the turn obscures the relationship of the vein exposed underground with those observed in the bluffs above the portal.

An adit was driven below some surface trenching about 1,200 feet east of Oregon Gulch and on the western part of Lot 8897. An old trail leads from the Foster Ledge camp to the adit about 2,000 feet distant. The adit was driven near the northern end of a prominent northerly striking depression which undoubtedly is the topographic expression of a large northerly trending fault that was encountered beneath it in the underground workings. Visible gold is reported to have been present in one of the veins outcropping above the adit.

The adit was driven north 17 degrees west for 168 feet, then north 36 degrees west for 83 feet to the face. At a point 23 feet back from the face a crosscut was driven north 58 degrees east for 60 feet and then north 70 degrees west for 50 feet.

The rocks exposed underground are interbedded 1- to 6-inch beds of dark argillite, argillaceous schist and hard grey quartzite striking north 10 to 20 degrees west and dipping 40 degrees eastward.

A 1- to 4-inch unmineralized quartz vein, strike north 22 degrees east and dip 70 degrees westward, was crossed 70 feet from the portal. At 118 feet from the portal a drift was driven 20 feet south-west on a 1- to 8-inch quartz vein striking north 38 degrees east and dipping 62 degrees north-westward. At the northern end of this vein near the crosscut a narrow vein branches from it following a fracture about 5 degrees east of north. The quartz in the drift has a narrow selvage of ankerite along the walls, but appears to contain no pyrite mineralization. A fault-zone composed of 1 to 3 feet of gouge and broken rock is exposed at the face and in a short crosscut about 30 feet back from the face. The fault strikes about north 10 to 15 degrees west and appears to dip 60 to 70 degrees east. Several other smaller northerly striking faults exposed in the adit may be branches from the larger one.

The crosscut to the north-east follows a north-westerly dipping slip which has faulted some quartz seen on the south-east wall and which does not appear in the north-westerly trending crosscut.

The veins in all three adits occupy westerly dipping fractures that belong to the regional north-north-easterly trending system. The veins are narrow and, except very locally, are sparsely mineralized. It is possible that prospecting along the Last Chance-

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* *Minister of Mines, B.C., Ann. Rept., 1935, p. C37.*

Nelson Creek fault may reveal areas of more intense fracturing where zones of more closely spaced veins might be found.

[References: *Geol. Surv., Canada,* Ann. Rept., Vol. III, Pt. C, 1889, p. 40; *Geol. Surv., Canada,* Mem. 149, 1926, p. 212; *Geol. Surv., Canada,* Mem. 181, 1935, p. 37; *Minister of Mines, B.C.,* Ann. Rept., 1877, p. 396; 1933, p. 126; 1935, p. C 27.]

Acme (14). The Acme group of six located claims is held by Adolph Gustafson, of Stanley. The claims extend southward down the ridge toward Stanley from the southern boundary of Lots 1666 and 1665. Some work was done on the showings many years ago, but most of the exploratory work has been done by the present owner.

The claims are underlain by hard, light-grey, slabby quartzite which near the south-west corner of Lot 10435 grades into a bed of pea-pebble conglomerate. The rocks strike about north 5 degrees east and dip 20 to 30 degrees east. The Last Chance-Nelson Creek fault runs through the claims, and it is believed that a strand of the fault is exposed in the westernmost open-cut where 2 feet of gouge and crushed quartz strike about north 30 degrees east.

The showings are at about elevation 4,700 feet, approximately 800 feet higher than Stanley. (*A*) The westernmost showing (*see* Fig. 5) is a 6-inch quartz vein exposed on the surface and in a shaft 10 feet deep. The vein strikes north 5 degrees east and dips 55 degrees west and is sparsely mineralized with pyrite and galena. Specimens containing fine free gold in the small cavities from which pyrite had been leached were seen on the dump. A sample of oxidized quartz from the vein was crushed and on panning yielded a tail of very fine gold. The fineness of gold from this vein is listed in Table II. A parallel 8-inch quartz vein lies 20 feet to the east, but it contains no visible mineralization and is not known to contain any gold.

(*B*) An adit was driven 138 feet on a bearing north 35 degrees west to intersect the downward extension of these veins at a depth of 75 feet. In it, hard grey quartzite strikes north 15 degrees east and dips 30 degrees east. Two narrow veins are crossed by the adit, which is still short of its objective. The first vein, 57 feet in from the portal, is 4 inches wide and strikes north 15 degrees east. Near the back of the drift it is cut off by a small bedded fault. Farther in a parallel 6- to 7-inch vein was crossed. It is stated by the owner that both these veins contain visible gold.

(*C*) Three hundred feet uphill to the north a vein striking north 30 degrees east and dipping 60 to 70 degrees north-westward is exposed for a length of about 150 feet by several pits and open-cuts. The vein is up to 12 inches wide and is sparsely mineralized with pyrite and galena. Some fine free gold is said to have been obtained from it.

(*D*) About 600 feet to the north-east a vein striking north 15 degrees east and dipping 70 degrees westward has been traced along its length by pits and stripping for about 300 feet. The quartz is up to 18 inches wide and is sparingly mineralized with pyrite, galena, and some sphalerite. At the surface much of the pyrite has been leached, but several small concentrations of galena may be seen. Selected pieces of quartz mineralized with galena (sample 169F) assayed: Gold, 0.12 oz. per ton; silver, 1 oz. per ton; and lead, 2.2 per cent. Fifty feet to the west another parallel vein is exposed in a trench 60 feet long. The quartz is 6 to 14 inches wide and is sparingly mineralized with pyrite and galena. A sample (172F) of quartz, with the most abundant pyrite from this vein, assayed: Gold, *nil;* silver, 0.1 oz. per ton.

(*E*) On the east side of the 300-foot vein described above under (*D*) and extending downhill for several hundred feet are three or more parallel veins up to 3 feet wide, mineralized with pyrite and galena and striking north 85 degrees east. From one of them a selected sample of galena (sample 171F) assayed: Gold, 0.01 oz. per ton; silver, 32.9 oz. per ton; and lead, 79.7 per cent. Between these veins are others, strike north 15 degrees east and dip 70 degrees westward, which with the easterly striking veins form a conjugate fracture pattern. A selected sample (170F) of leached and rusty quartz from one of the northerly striking veins assayed: Gold, 0.41 oz. per ton; silver, 0.5 oz. per ton.

The veins on the Acme group occupy fractures of two different directions. The quartz of both sets of veins is mineralized with pyrite and galena, but most visible gold appears to have come from the northerly striking veins. The two directions of fracturing and the gold mineralization close to the Last Chance-Nelson Creek fault suggest that further prospecting along the fault-zone might disclose additional areas of fracturing containing gold-bearing veins. Although the pyrite content of the veins is small, the constant association of gold with pyrite should provide sufficient encouragement to search for veins in which the pyrite content is greater.

Dominion (16).

The Dominion Nos. 1 to 6 and Dominion Nos. 25 and 26 Crown-granted Mineral Claims (Lots 11404 to 11411) are held by J. E. MacAlpine, 800 Hall Building, Vancouver. These claims were formerly held by Cariboo Ledge Mines Company, Limited, who built the camp buildings and did the underground work. The claims are on the south side of Lightning Creek and extend uphill on both sides of Anderson Creek. Camp buildings on Lot 11404 are reached by a short road which branches from the highway a few hundred feet west of Davis Creek.

The north-east half of Lot 11404 is underlain by grey flaggy quartzites and squeezed pebble conglomerate. The pebbles of the conglomerate are pea size and are of quartz. These rocks are overlain by about 100 feet of limestone which outcrops in the canyon on Anderson Creek near the eastern boundary of Lot 11404. The limestone in turn is overlain by bright-green chlorite schist which grades upward into brownish-weathering chlorite schist and quartzite. The belt of chloritic rocks appears to be 1,500 feet or more wide. The rocks strike north to north 30 degrees west and dip from 20 to 40 degrees westward. The claims lie on the south-west side of the major anticlinal axis, but the limestone and chloritic schists are not repeated on the north-east side.

The workings consist of two adits in the eastern corner of Lot 11410, about 20 feet above Lightning Creek. The rock exposed in the two adits is hard, massive, light-grey, quartz, pea-pebble conglomerate.

The eastern adit was driven 100 feet south 14 degrees west following a quartz vein 3 to 20 inches wide that dips 75 degrees east. A sample of almost pure pyrite 47 feet from the portal assayed: Gold, trace; silver, 0.3 oz. per ton. At 70 feet from the portal a crosscut was driven 25 feet west. It crosses a parallel vein 6 inches wide and an irregular pattern of 2- to 8-inch quartz stringers very sparingly mineralized with quartz. A sample containing about one-third pyrite from the 6-inch parallel vein assayed: Gold, 0.03 oz. per ton; silver, *nil*.

The portal of the second adit is 41 feet north 56 degrees west from the portal of the eastern adit. It is driven 32 feet south 39 degrees west along a vein that dips 70 degrees south-eastward. The vein at the portal is about 3 feet wide but narrows to 6 to 20 inches at the face. There is also an isolated 3-foot mass of quartz on the west wall at the face. The quartz is sparsely mineralized with pyrite. A selected sample of quartz containing about 10 per cent. pyrite from the vein on the east side of the face assayed: Gold, *nil*; silver, 0.6 oz. per ton. A selected sample of rusty quartz on the west side of the face assayed: Gold, trace; silver, 0.1 oz. per ton.

Cariboo Amalgamated Gold Mines, Ltd. (47).

The company, care of J. C. Oswald, 703 Royal Trust Building, Vancouver, owns seven Crown-granted mineral claims (Lots 11350 to 11355 and 9443 and 9444) extending along Devils Lake Creek. The claims are largely underlain by the several bands of black argillaceous quartzite that may be seen outcropping along the road north of the Public Works camp. On the north side of the road the rocks strike about north 35 degrees west, dip 30 to 50 degrees north-eastward, and lie on the north side of a drag-fold whose axis pitches 25 degrees east through Lots 11351 and 11355.

Most of the work was done on the Eldorado claim (Lot 11350) and along the south boundary of Lot 9443. Numerous sloughed open-cuts north of the Public Works camp on Lot 11350 indicate the presence of a number of quartz veins having widths of 2 feet

or more. Sloughing has obscured the attitude of the veins, of which some are parallel to the formation and others cut across it. The vein-quartz is only sparingly mineralized with pyrite.

[Reference: *Minister of Mines, B.C.*, Ann. Rept., 1933, p. 124.]

Lot 10443C (48). Lots 10440C to 10443C and several others were held in 1933 by B.C. Cariboo Gold Fields, Limited. Lot 10443C is underlain by hard, massive grey quartzite and fine quartz pebble conglomerate striking about north 10 degrees east and dipping 30 degrees east. Several strands of the Grub Gulch-Coulter Creek fault run through the north-western half of Lot 10443C. Near them the rocks are silicified and jointed, strike north 20 degrees east and dip 80 degrees westward. A vein crosses the western boundary of Lot 10443C, 315 feet south of the north-west corner post. The vein has been stripped for 100 feet along its length, strikes north 55 degrees east, dips 65 degrees north-west, and ranges from 8 inches to 4 feet in width. A shaft on it was sunk to a depth of 20 feet. Selected pieces of leached and oxidized quartz from the dump assayed: Gold, 0.04 oz. per ton; silver, trace.

Nelson Creek (2). The Nelson Creek group of six claims is recorded by B. Fink, of Barkerville. The claims lie south of Slough Creek and west of Nelson Creek. On the south the claims adjoin the Canyon group of eight claims located by W. M. Hong. The claims are crossed by the Last Chance-Nelson Creek fault which was uncovered in the autumn of 1945 by hydraulicking in a pit several hundred feet west of the western boundary of Lot 10544C. The fault-zone where exposed in the hydraulic pit is about 100 feet wide. On the western side a large slab of quartz 2 to 3 feet thick and about 30 feet long lies on the foot-wall of the fault. The quartz is vuggy and is sparsely mineralized with pyrite, galena, and sphalerite. A selected sample of the best mineralization assayed: Gold, *nil*. Whether this is a piece of drag quartz or whether the quartz was deposited in the fault-zone is not known. About 200 feet to the north a 4-foot quartz vein continues northward for some distance and may be the extension of the vein exposed in the hydraulic pit.

The following Table IX lists assays of samples from various parts of the Stanley area. The veins are not described elsewhere in this report.

Table IX.—Tabulation of Assays from Stanley Area not mentioned elsewhere in this Report.

Location.	Description.	Gold.	Silver.
Grub Gulch hydraulic pit	Pyritized quartz from fault-zone	Trace	*Nil*
Grub Gulch hydraulic pit	Pyrite cubes from clean-up concentrates	Trace	*Nil*
Grub Gulch hydraulic pit fault-zone	Vein-quartz with fine-grained pyrite mineralization	Trace	*Nil*
Van Winkle Creek, 1,000 feet up from mouth	6-inch quartz vein	*Nil*	*Nil*
Chisholm Creek, 400 feet south-west of north-west corner Lot 8897	6- to 8-inch quartz vein with pyrite and some galena	*Nil*	*Nil*
Spruce Canyon-Lightning Creek*	4-inch quartz vein in chlorite schist with some pyrrhotite and chalcopyrite	*Nil*	*Nil*
Spruce Canyon-Lightning Creek*	16-inch quartz vein (no mineralization)	*Nil*	*Nil*
Spruce Canyon-Lightning Creek*	18-inch rusty quartz vein	Trace	*Nil*
Perkins Creek, Eatman hydraulic pit fault-zone	Quartz mineralized with pyrite	Trace	*Nil*
Butcher Bench fault-zone	Crushed quartz with pyrite mineralization	*Nil*	*Nil*
Butcher Bench at east end	6-inch formational quartz vein with some pyrite	*Nil*	*Nil*
Amador Creek, 1,200 feet up from mouth	6-inch quartz-ankerite vein	*Nil*	*Nil*
Rask hydraulic pit	6-inch quartz vein with 10% pyrite	*Nil*	*Nil*
Rask hydraulic pit	Quartz float with 60% pyrite	*Nil*	*Nil*
Dry Gulch, 700 feet west of Perkins Creek	20-inch rusty quartz vein	Trace	Trace
Devils Lake Creek—L. Bedford's hydraulic pit fault-zone	Quartz mineralized with pyrite	Trace	Trace

* Refer to Van Winkle in *Minister of Mines, B.C.*, Ann. Rept., 1933, p. 126.

Table IX.—Tabulation of Assays from Stanley Area not mentioned elsewhere in this Report—Continued.

Location.	Description.	Gold.	Silver.
Nelson Creek hydraulic pit fault-zone	Quartz with small amount of pyrite, sphalerite, and chalcopyrite	*Nil*	*Nil*
Nelson Creek hydraulic pit	Pyrite cubes from clean-up concentrates	Trace	Trace
West Fork Last Chance Creek	Quartz with pyrite (float)	Trace	Trace
Near north-west corner Lot 1685c	Selected quartz with some pyrite	Trace	*Nil*
At north-east corner Lot 1684c	Iron-stained, selected quartz	*Nil*	*Nil*
Bridge Island Gold Co.—adit dump	Selected quartz, 7% pyrite	Trace	Trace
Bridge Island Gold Co.—adit dump	Selected quartz, 15% pyrite	*Nil*	*Nil*
Bridge Island Gold Co.—adit dump	Selected quartz, 30% pyrite	Trace	*Nil*
Nelson Creek below New Creek ditch	Horsetooth quartz float, 5% pyrite	*Nil*	*Nil*
Nelson Creek, 500 feet below New Creek ditch	Vein quartz with 20% pyrite	*Nil*	*Nil*

PLACER PROPERTIES.

Lightning Creek Section.

Ennerdale Placer (37). One placer lease extending up Grub Gulch from its mouth is held by F. Freeman and J. Hind, of Stanley. Hydraulic equipment was installed in 1939 and operations began in 1940. Since then the pit has been advanced southerly up Grub Gulch for about 900 feet from Lightning Creek. Water under a head of about 80 feet was obtained from Van Winkle Creek through about 2,000 feet of flume and ditch. The height of the bank has increased with the southerly advance of the pit and in 1945 had reached a height of about 110 feet. In order to obtain a higher head of water, a new dam was built in 1946 on Grub Gulch about 1,200 feet south of the head of the pit. Water from Van Winkle Creek will be diverted through an old ditch whose intake is about 5,000 feet up from the mouth of Van Winkle Creek.

In 1945 three north-easterly trending fault-zones in a width of 100 feet were to be seen when bedrock was exposed in the bottom of the pit. In the faults there was a considerable amount of granulated quartz which, although well mineralized with pyrite, assayed: Gold, trace. The assays of galena pebbles obtained from concentrates from this pit are given in Table I, Group 4, page 27.

The gold production of Grub Gulch is listed in Table IV and the gold fineness in Table VI.

Estman Hydraulic (34). Two placer leases on the upper part of Perkins Creek are held by Mrs. C. Estman, of Ladner. A small hydraulic plant was installed, using the small flow of Perkins Creek. Bedrock is overlain by about 25 feet of gravel and boulder-clay. The hydraulic pit was advanced up the creek and by 1941 was almost to the north boundary of Lot 10734c. Since then no work has been done.

The working lies about 3,000 west of the Perkins veins on Burns Mountain. Presumably some of the placer gold may have been derived from the erosion of those veins.

The recent gold production of Perkins Creek is listed in Table IV and the fineness of the gold in Table VI.

Eagle Creek Hydraulic (44). Six placer leases on Houseman (Eagle) Creek and on Lightning Creek near the junction of Houseman Creek are held by Mr. and Mrs. Leroy Biggs, of Stanley. Bedrock gravel in Houseman Creek was drifted by Otto Muller to a point about 1,200 feet up-stream from the junction with Lightning Creek. In 1926 the Cariboo Eagle Mining Company, Limited, built a storage-dam and installed a hydraulic system to use water from Houseman Creek.

The company began hydraulicking in 1926 and worked the ground for several years. Since then hydraulicking has been continued on a smaller scale. In recent years the amount of gravel mined annually has been small and the gold production low. The head of the pit is about 500 feet beyond the end of the old drift workings and about 1,700 feet from Lightning Creek. The bank is about 100 feet high.

[Reference: *Minister of Mines, B.C.*, Ann. Rept., 1926, p. 169; 1927, p. 167; 1931, p. 86.]

Brown Lease (46). One placer lease at the mouth of Lost Chance Creek, opposite Stanley, is held by Alf. Brown, of Stanley. The old channel of Last Chance Creek near its junction with Lightning Creek is buried to a depth of from 70 to 100 feet. In its lower stretch the buried channel does not follow the course of the creek or of the lower part of the hydraulic pit, but lies beneath a gravel bench on the east side. Part of the old channel was drifted during the 1870's up-grade from the Vulcan shaft workings on Lightning Creek and down-grade from a shaft on Last Chance Creek. A segment of unworked gravel, either in the channel or on a bedrock bench on the east side, was found and tested by a number of drill-holes put down by Alf. Brown. On a gravel bench 75 feet or so above Lightning Creek and near the north-east corner of Lot 11418, Brown has sunk a vertical shaft to a depth of 90 feet. Bedrock was encountered at 73 feet depth. He intends to mine the bedrock gravel from the shaft.

Bowman Mines, Ltd. (40). Seven leases on Amador Creek and on Lightning Creek at the mouth of Amador are held by Bowman Mines, Limited, 402 Pender Street West, Vancouver. Water for hydraulicking is obtained from upper Lightning Creek through several miles of ditch and flume built by the Lightning Creek Hydraulic Mining Company, Limited, in 1910. A prominent terrace about 300 feet above the level of Lightning Creek lies on the north side of the creek, east of the mouth of Amador Creek. About 250 feet of gravel, boulder-clay, and stratified clay and silts rest on bedrock which is about 50 feet above creek-level and about the same elevation as Butcher Bench. To the north-east, on the bank side, the bedrock decreases in level and a bedrock depression appears to run beneath the high bank.

In 1940 and 1941 R. E. MacDougall, of Wells, held an option on the property and hydraulicked half a million or more yards of gravel in an attempt to test the bedrock gold values in the gutter beneath the high bank. In 1947 Interior Development Company was hydraulicking the bank in a renewed attempt to reach bedrock. The gold content of the overburden is not known, but evidently is very low.

Slough Creek Section.

Ketch Placer (5). Hydraulic operations at the west end of the Ketch pit were begun in 1921 by the Houser brothers. Since then hydraulicking has been carried on each year, and in recent years operations have been managed by R. E. MacDougall, of Wells. Water for hydraulicking is obtained from Burns Creek, and also from Oregon Gulch and the head of Devils Lake Creek by ditch and flume along the east side of Devils Canyon. The hydraulic pit has been advanced eastward along bedrock benches almost to China Gulch, a length of about 1,100 feet and with a width of about 250 feet. Tailings from the operations are flumed across the highway. The position of the highway interferes with the working of ground lying to the north of the present pit. During the last several years, work has been limited mainly to cleaning up the old Ketch pit.

The benches lie about 50 feet above Slough Creek and are comparable to those extending between Devils Lake Creek and Nelson Creek. Production of placer gold is given in Table V.

Slough Creek Benches (2 and 3). The Slough Creek benches, since their discovery in 1881, have been worked by Chinese companies, which included the Point Hydraulic Mining Company, Tong Sing Tong, Dang Sing Dang, and others. For some years the Point Company was managed by J. Wendle, of Barkerville, and in later years W. M. Hong, of Barkerville, has been in charge of the operations. Water for hydraulicking is brought by ditch from Montgomery, New, and Nelson Creeks, and also by ditch and siphon across Devils Lake Creek from Jack of Clubs, Pinkerton, and Burns Creeks. An extensive area of bedrock about 4,000 feet long and 600 feet or more wide has been laid bare by hydraulicking.

Operations during the last few years have been on a greatly reduced scale, by reason of the higher operating costs and the lower gold content of marginal gravel that is overlain by increased depths of barren overburden.

Production of placer gold from the section has been large and is given in Table V.

Rask Hydraulic (8). Eric Rask, of Wells, holds one placer lease at the head of Devils Lake Creek. A small hydraulic pit was opened and operated since 1943 on the east side of the road at the divide between Devils Lake and Chisholm Creeks. A small amount of water for hydraulicking is collected by ditch from small tributaries along the east side of the valley. The pit has been abandoned, and in 1947 Rask was preparing to open a new pit on the east side of the road about 1,000 feet north of the old one.

Leo Bedford's Hydraulic (7). Leo Bedford and K. Huttula, of Wells, have a half interest in the Barton lease lying on the west side of Devils Lake Creek just north of Hong's siphon. Water for hydraulicking is obtained, by arrangement, from Hong's ditch which runs along the hillside just above the pit. Bedrock gravel lying about 100 feet above Devils Lake Creek was first encountered in a drift. Later a small hydraulic pit was opened up and advanced about 260 feet westward.

Coulter Creek Hydraulic (1). Four leases on Coulter Creek are held by the Julius Powell estate and J. Chouse, of Wells, and his two partners. The ground, first hydraulicked by Julius Powell since about 1924 and latterly by J. Chouse, is a buried channel of Coulter Creek lying about 30 feet above and on the north side of Coulter Creek. The pit is about 1,100 feet long and 250 feet wide. Bedrock gravel is overlain by from 25 to 100 feet of boulder-clay. The bedrock gradient is about 10 per cent. Water for hydraulicking, from a ditch system that collects the run-off from upper Coulter Creek, is under a head of about 150 feet. The drainage area is small and little water is available from mid-July onward.

In 1947 the ground was under option to Alvo von Alvensleben. The first clean-up, made on July 10th after sixty-five days of piping, is reported to have amounted to 186 oz. of crude gold from an area of approximately 25,000 square feet of bedrock.

Production of placer gold is given in Table V.

PLATE I.

A. View down Lightning Creek with Stanley in the middle distance. Rock-piles from the Vancouver shaft flank the creek.

B. Looking south-west across Lightning Creek to Butcher Bench where bedrock is completely exposed by recent hydraulicking. Mouth of Amador Creek in extreme right foreground.

A. View down upper Oregon Gulch. Chisholm Creek valley in middle distance, Lightning Creek valley in far distance.

B. Interbedded light- and dark-grey quartzite, showing the squeezing and pinching out of beds.

PLATE III.

A. Axial plane cleavage developed in hard, coarse quartzite. Bedding, indicated by fractures parallel to faint colour-band on right-hand side, dips steeply left and is flattening at top of picture; pick-handle lies in plane of gently right-dipping cleavage.

B. Small drag-fold in light-grey quartzite on the west side of Devils Lake Creek.

A. Drag-folding in argillite and argillaceous quartzite on main road north of Public Works camp.

B. Drag-folding in grey quartzite on main road north of Public Works camp. The pick rests on a curved surface that follows a bedding-plane. Note the variable pitch of the fold axes.

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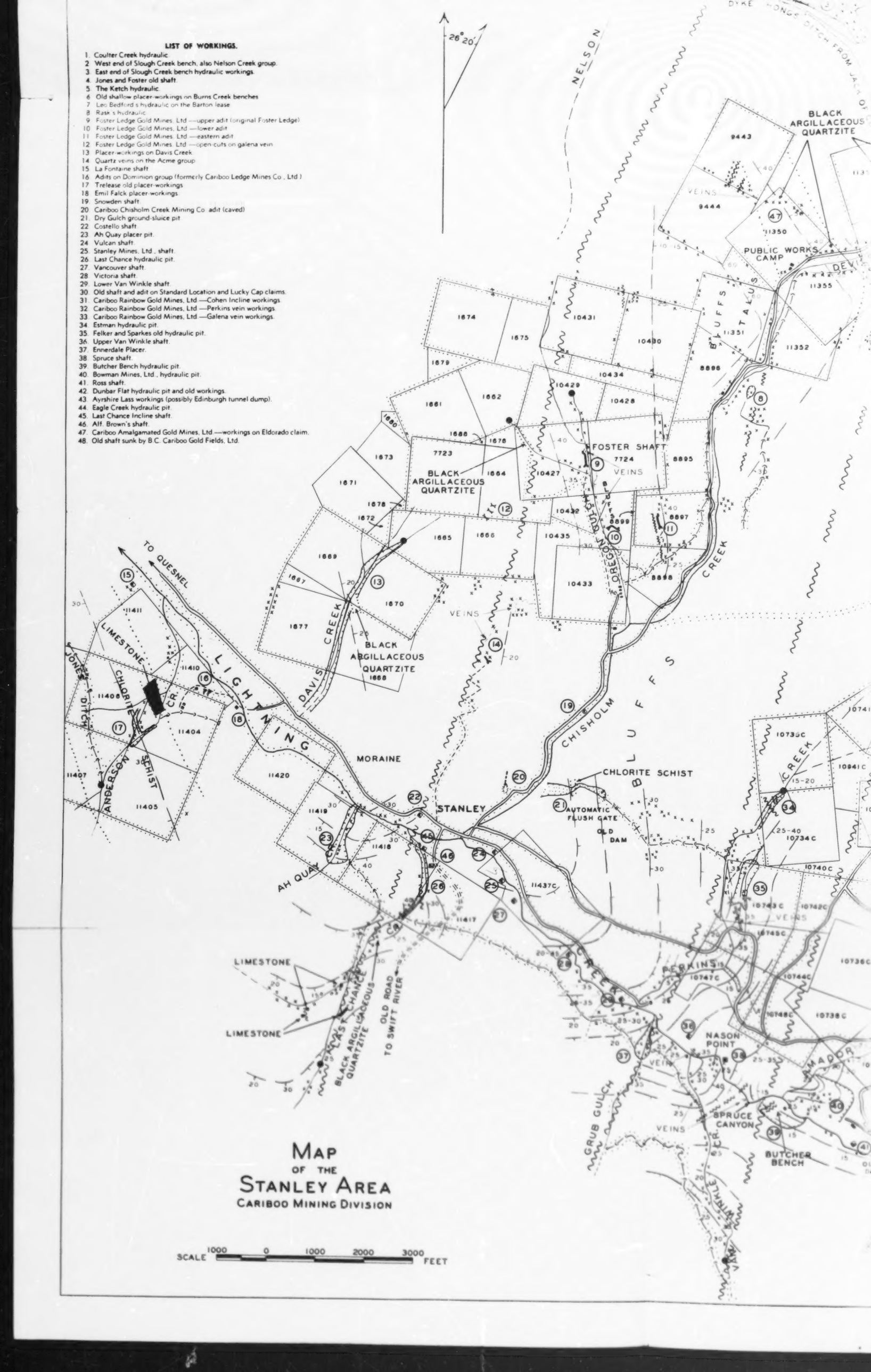
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31. Cariboo Rainbow Gold Mines, Ltd.—Cohen Incline workings.
32. Cariboo Rainbow Gold Mines, Ltd.—Perkins vein workings.
33. Cariboo Rainbow Gold Mines, Ltd.—Galena vein workings.
34. Estman hydraulic pit.
35. Felker and Sparkes old hydraulic pit.
36. Upper Van Winkle shaft.
37. Ennerdale Placer.
38. Spruce shaft.
39. Butcher Bench hydraulic pit.
40. Bowman Mines, Ltd., hydraulic pit.
41. Ross shaft.
42. Dunbar Flat hydraulic pit and old workings.
43. Ayrshire Lass workings (possibly Edinburgh tunnel dump).
44. Eagle Creek hydraulic pit.
45. Last Chance Incline shaft.
46. Alf. Brown's shaft.
47. Cariboo Amalgamated Gold Mines, Ltd.—workings on Eldorado claim.
48. Old shaft sunk by B.C. Cariboo Gold Fields, Ltd.
26° 20'
NELSON
DYKE
HOUSE DITCH FROM JACK O
BLACK ARGILLACEOUS QUARTZITE
9443
9444
VEINS
11350
PUBLIC WORKS CAMP
11355
BLUFFS
TALUS
11351
11352
8896
1674
1675
10431
10430
1679
10434
1661
1662
10429
10428
1680
1676
FOSTER SHAFT
7724
8895
1673
7723
1664
10427
VEINS
BLACK ARGILLACEOUS QUARTZITE
1671
1678
1672
10432
8897
8899
1665
1666
10435
1669
1667
10433
8898
1670
1677
DAVIS CREEK
BLACK ARGILLACEOUS QUARTZITE
1668
VEINS
OREGON GULCH
CREEK
TO QUESNEL
LIMESTONE
11411
11410
CHLORITE
11408
JONES DITCH
11404
11407
ANDERSON SCHIST
11405
LIGHTNING CR.
MORAINE
11420
11419
11418
AH QUAY
STANLEY
CHISHOLM
BLUFFS
CHLORITE SCHIST
AUTOMATIC FLUSH GATE
OLD DAM
11437C
11417
10735C
10734C
10740C
10743C
10742C
10745C
10747C
10744C
10748C
10738C
10736C
CREEK
PERKINS
NASON POINT
SPRUCE CANYON
GRUB GULCH
BUTCHER BENCH
LIMESTONE
LIMESTONE
LAST CHANCE
BLACK ARGILLACEOUS QUARTZITE
OLD ROAD TO SWIFT RIVER
MAP
OF THE
STANLEY AREA
CARIBOO MINING DIVISION
SCALE 1000 0 1000 2000 3000 FEET

LEGEND
CABIN
ROAD
TRAIL
PLACER WORKING
UPPER LIMIT OF PLACER WORKINGS
BEDROCK OUTCROPS
NO OBSERVED OUTCROPS ON TRAVERSED LINE
SHAFT
ADIT
DITCH OR FLUME
FAULT
BEDROCK STRUCTURAL TRENDS WITH DIP INDICATED
VEIN
LIST OF WORKINGS.
1. Coulter Creek hydraulic.
2. West end of Slough Creek bench, also Nelson Creek group.
3. East end of Slough Creek bench hydraulic workings.
4. Jones and Foster old shaft.
5. The Ketch hydraulic.
6. Old shallow placer-workings on Burns Creek benches.
7. Leo Bedford's hydraulic on the Barton lease.
8. Rask's hydraulic.
9. Foster Ledge Gold Mines, Ltd.—upper adit (original Foster Ledge).
10. Foster Ledge Gold Mines, Ltd.—lower adit.
11. Foster Ledge Gold Mines, Ltd.—eastern adit.
12. Foster Ledge Gold Mines, Ltd.—open-cuts on galena vein.
13. Placer-workings on Davis Creek.
14. Quartz veins on the Acme group.
15. La Fontaine shaft.
16. Adits on Dominion group (formerly Cariboo Ledge Mines Co., Ltd.).
17. Trelease old placer-workings.
18. Emil Falck placer-workings.
19. Snowden shaft.
20. Cariboo Chisholm Creek Mining Co. adit (caved).
21. Dry Gulch ground-sluice pit.
22. Costello shaft.
23. Ah Quay placer pit.
24. Vulcan shaft.
25. Stanley Mines, Ltd., shaft.
26. Last Chance hydraulic pit.
27. Vancouver shaft.
28. Victoria shaft.
29. Lower Van Winkle shaft.
30. Old shaft and adit on Standard Location and Lucky Cap claims.
31. Cariboo Rainbow Gold Mines, Ltd.—Cohen Incline workings.
32. Cariboo Rainbow Gold Mines, Ltd.—Perkins vein workings.
33. Cariboo Rainbow Gold Mines, Ltd.—Galena vein workings.
34. Estman hydraulic pit.
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37. Ennerdale Placer.
38. Spruce shaft.
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40. Bowman Mines, Ltd., hydraulic pit.
41. Ross shaft.
42. Dunbar Flat hydraulic pit and old workings.
43. Ayrshire Lass workings (possibly Edinburgh tunnel dump).
44. Eagle Creek hydraulic pit.
45. Last Chance Incline shaft.
46. Alf. Brown's shaft.
47. Cariboo Amalgamated Gold Mines, Ltd.—workings on Eldorado claim.
48. Old shaft sunk by B.C. Cariboo Gold Fields, Ltd.
20°20'
SLOUGH CREEK
NELSON CREEK
HYDRAULIC TAILINGS
DYKE
HONGS DITCH FROM JACK OF CLUBS CR.
OLD UNUSED DITCH
BLACK ARGILLACEOUS QUARTZITE
PUBLIC WORKS CAMP
DEVIL'S LAKE
BLUFFS
FOSTER SHAFT
VEINS
BLACK ARGILLACEOUS QUARTZITE
HOTH DITCH
DAVIS CREEK
BLACK ARGILLACEOUS QUARTZITE 1668
TO QUESNEL
LIGHTNING
LIMESTONE
CHLORITE SCHIST
JONES DITCH
ANDERSON CR.
MORAINE
CHISHOLM CREEK
CHLORITE SCHIST
AUTOMATIC FLUSH GATE
OLD DAM
STANLEY
AH QUAY
LIMESTONE
LIMESTONE
LAST CHANCE ARGILLACEOUS QUARTZITE
OLD ROAD TO SWIFT RIVER
PERKINS
NASON POINT
MORAINE

A
26°20'
NELSON
DYKE
HONGS DITCH FROM JACK OF CLUBS CR.
OLD UNUSED DITCH
HYDRAULIC TAILINGS
LIMESTONE
ROAD TO WELLS
TO SLOUGH CREEK
CHLORITE SCHIST
BLACK ARGILLACEOUS QUARTZITE
CREEK BLUFFS
RESERVOIR
HONGS SIPHON
PUBLIC WORKS CAMP
DEVILS LAKE
TRAIL TO ROAD
OLALLY CR.
FOSTER SHAFT
VEINS
BURNS
BURNS MTN. 5560'
OREGON GULCH
CHISHOLM CREEK
BLUFFS
STANLEY
AUTOMATIC FLUSH GATE
OLD DAM
PERKINS CREEK
NASON POINT
SPRUCE CANYON
BUTCHER BENCH
GRUB GULCH
QUADDY CREEK
DUNBAR FLAT
URQUHART GULCH
HOUSEMAN EAGLE CR.
CANYON
TO ACCOMPANY BULLETIN 26

STRUCTURAL TRENDS
ED

28° 20'

STANLEY

CHISHOLM

CHLORITE SCHIST

AUTOMATIC FLUSH GATE
OLD DAM

FOSTER SHAFT

OREGON GULCH

NELSON

CREEK

SLOUGH

CREEK

LUFFS

LUFFS TALUS

PUBLIC WORKS CAMP

BLACK ARGILLACEOUS QUARTZITE

DYKE

HONGS DITCH FROM JACK OF CLUBS

OLD DUGOUT DITCH

HYDRAULIC TAILINGS

MORAINE

LIMESTONE

TAILINGS

CANYON CREEK

COULEE CANYON

PERKINS

NASON POINT

CREEK

BURNS

BURNS MTN.
5560'

BLACK ARGILLACEOUS QUARTZITE

TRAIL TO ROAD

BLACK ARGILLACEOUS QUARTZITE

CREEK RESERVOIR

HONGS SIPHON

LUFFS

BLACK ARGILLACEOUS QUARTZITE

CHLORITE SCHIST

ROAD TO WELLS

TO SLOUGH CREEK

OLALLY CR.